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“Trade Diversion”—An Australian Interlude

By NOEL F. HALL

THE announcement early in December, 1937, that the Australian Government had abandoned the policy of “trade diversion” which it had adopted in May, 1936, marks the end of an episode which must be well nigh unique in the history of international trade. It was in part a bi-product of the Ottawa system and the subsequent epoch of bi-lateralism, but it differs from them in the speed with which its effects made themselves apparent. For this reason alone it probably deserves a place amongst the curiosities of economic literature.

The policy, which carried to its logical conclusion aimed at a balancing of commodity trade between Australia and each and all of her several customers, does not seem to have been entirely unpremeditated. In November, 1935, and in March, 1936, the Government introduced new tariff schedules covering a large number of items which had been the subject of some fifty reports by a very painstaking and conscientious Tariff Board. These new tariffs reintroduced rates of duty intermediate between the British preferential rate and the general duty, but it was pointed out that these intermediate duties would only be applied to countries which entered into bi-lateral trade agreements with Australia. The countries concerned were peculiarly slow to take the bait offered to them and the Trade Diversion policy seems to have been intended to bring further pressure to bear upon them to do so.

The policy was announced in May, 1936, and had as its objective the limitation of the imports of many goods from foreign countries with the object of stimulating the expansion of secondary industries in Australia and of increasing trade with those countries which were buyers of Australia's primary products. The importation from countries outside

the Empire of a large range of goods was prohibited unless specially licensed by the minister, and *in addition* prohibitive duties were placed upon a large range of cotton and rayon piece goods. The avowed objective of this new policy was the simple-minded but mistaken one that it is desirable that trade shall be balanced as far as possible with each country, that bad customers are those from whom one buys more than one sells and *vice-versa*. The idea was to shift Australian imports from those countries who bought small quantities of Australian goods to those who purchased more freely. In practice this policy was used as a weapon against Japan and against Japanese imports. But Japan was a very good customer indeed; she sold to Australia only about one-half of what she bought from Australia, and more and more as a customer her position had been showing marked improvement. Australia's favourable balance of commodity trade with Japan was about £6 million sterling in the last completed trade year before the Trade Diversion policy was inaugurated: it provided, in fact, roughly one-quarter of the sum which she needs annually to meet her overseas interest payments.

But it was against Japan that the Trade Diversion policy was principally applied. The effect of the changes in duties introduced was enormous, particularly so far as artificial silk piece-goods were concerned. The previous duties had been 20 per cent. *ad valorem* on British goods and 40 per cent. on foreign goods. In both cases an additional primage duty of 10 per cent. was charged. The new duties were to be, per square yard, British Preferential Tariff 1½d., Intermediate Tariff 8d., General Tariff 9d. But provision was made for the admission of goods ordered before 15th March and entered by 30th November at special by-law rates under which the British preferential tariff was ½d. per square yard and the intermediate and general rates were 3d. per square yard. No primage duty was charged on British goods, but foreign goods were charged 5 per cent. in addition to the above rates. On cotton piece goods an even wider margin in favour of Britain was established. The British rate was to be ½d. per square yard or 5 per cent. whichever was lower for unbleached, bleached and printed, dyed or coloured cloth. The general tariff rates were 2½d., 3d. and 3½d. respectively without the *ad valorem* alternative. A primage duty of 5 per cent. was also collected from foreign

goods. In this case there were no by-law concessions for goods ordered before 15th March and admitted by 30th November and the intermediate rates offered to those who negotiated bi-lateral agreements were only $\frac{1}{4}$ d. per square yard less than the general rate and were five to six times greater than the British rate.¹ The impact of these new duties was made the more severe by making them retrospective to goods that had been ordered eight weeks before the new duties were announced. There were further administrative complications introduced in the interpretation of what the words "on order" meant. *The Oriental Economist* gives certain examples of the position under the new Australian duties. Japanese voiles costing 16 sen per yard were dutiable at 63 sen while British voiles costing 40 sen per yard had to pay only 10.5 sen. Japanese cotton goods worth 14 sen per yard were dutiable at 19 sen, while British goods worth 20 sen were taxed at $3\frac{1}{2}$ sen. The figures above seem to show that the object of the new policy was largely political in character, that is to say an attempt to compel the Japanese to make a bi-lateral agreement with Australia. This they had in previous years refused to do, although there had been much preliminary discussion and negotiation. The intermediate tariff did not offer a sufficient attraction to the Japanese, nor were they induced to take up a more compliant attitude by the extreme duties now demanded. As has already been pointed out, the intermediate duties, which were the "bait" offered to those making bi-lateral agreements, were so very much higher than the British preferential rates that the benefits to be obtained from them were almost negligible. It appears that Australia was spoiling for a fight and the Japanese did not refuse the challenge. They retaliated by imposing duties of 50 per cent. on Australian goods or by prohibiting them altogether. Australia retaliated again and placed 38 classes of Japanese goods upon the prohibited list. Again there was an excess of administrative zeal. Australian importers who before these new prohibitions were introduced had paid for goods ordered from Japan by irrevocable letters of credit, could neither get the goods admitted into Australia nor get their money back! Japan stopped bidding at the Australian sales for wool, purchased largely in South Africa

¹ See Copland and Janes, *Australian Trade Policy. A Book of Documents 1932-37*, pp. 262-3.

and elsewhere, and redoubled her efforts to produce wool in her own or in associated territories. Manchuria, the third largest buyer of Australian wheat, prohibited its importation, and Australia found that she had bitten off more than she could chew. Dr. Earle Page, Minister of Commerce and head of the county party, whose members had become the chief victims of the new policy, hurried home from England, taking with him the administrative head of the Commerce Department, who had also been absent while those amazing developments were taking place.

The full effect of this dispute has only recently become apparent. In the year 1935-6 in her trade with the Far East as a whole, Australia had a favourable balance of trade in the neighbourhood of six million sterling. The effect of the Trade Diversion policy was to reduce Australian exports to the Far East by six and a half million sterling, while her imports from the Far East rose by roughly a million sterling. So that the net effect of this Trade Diversion policy, supposed to be directed against the bad customers, was to change an excess of commodity exports of roughly six million into an excess of commodity imports of very nearly two million, the exact opposite of what the policy set out to do. In addition to this general result, which for a country like Australia, which needs to accumulate a substantial surplus on her commodity trade to meet her external financial obligations, was particularly embarrassing, a number of particular difficulties revealed themselves which tend to demonstrate, if demonstration is needed, the danger of trying to disturb the processes of trade on the basis of crude statistical calculations. Even before the dispute was concluded Australia had suddenly to change her mind with regard to the importation of cheap Japanese calico bags which she used in large quantities for packing her exports of flour to Far Eastern countries which had increased markedly since the fall in prices after 1928. The reprehensible low level of price of this "bad" import was unfortunately necessary to make possible the "good" export of Australian milled flour. The millers and the growers of wheat were more highly organised than the consumer of low grade textiles and they were able to secure their particular interest before the general dispute was terminated.

By December, 1936, Australia had had enough and a temporary agreement to last until June, 1938, was negotiated. Japan agreed to admit, though not necessarily to oblige her merchants to buy, up to a total of 800,000 bales of wool during the period of the agreement, a considerably smaller total than the $1\frac{1}{2}$ million bales which she might have been expected to purchase on the basis of figures for the period before the dispute. Australia undertook to reduce the intermediate tariff rates on cotton piece goods and artificial silk goods and to apply the new intermediate rates instead of the general rates to Japanese goods. The following were the changes in the intermediate rates:—

Cotton piece goods, unbleached, from $2\frac{1}{2}$ d. to $1\frac{1}{4}$ d.

„ „ „ bleached, from $2\frac{3}{4}$ d. to $1\frac{1}{2}$ d.

„ „ „ printed, dyed, etc., $3\frac{1}{4}$ d. to 2d.

and the intermediate rate on artificial silk piece goods was reduced from 8d. to 4d. But during the period of the agreement the total quantity of imports, other than calico for bag-making, was to be limited to $153\frac{3}{4}$ million square yards, divided equally between cotton and artificial silk piece goods.¹ If any reliance can be placed upon the figures of the rate of growth of imports of Japanese textiles into Australia it would appear that Lancashire has not done badly out of the bargain. But in general Australia seems to have got distinctly the worst of things in the economic battle, particularly when it is remembered that the agreement expires in the middle of this year and it was hoped that before it did so it could be replaced by a more permanent settlement. The Sino-Japanese incident seems to make this unlikely.

It is therefore very important to look behind this strange episode and to ask why it is that a policy designed by Australia to be used to discipline her "bad" customers should, in fact, have been employed to disturb trade relations with Australia's second best customer and one who is of increasing importance to her whole economy. Since 1929 Japan has steadily improved her position as a purchaser of Australian products, and in the year before the dispute started ranked as a customer second only to the United Kingdom and bought very nearly as much as France, Germany, Holland, Belgium and Italy combined.

Competent independent Australian opinion is inclined to

¹ Copland and Janes, *op. cit.*, p. 287.

see in the whole incident a backwash upon Australia of the policies of protectionism which have developed in the world at large and in the Empire as a whole since the depression. Mr. Charles Hawker points out that the exclusion of the Japanese exports from a very large number of other markets by, for example, the imposition of quotas in colonial territories, and by other devices, had resulted in a very great pressure upon the Australian market by Japanese imports.

. . . "The quantities of wool, wheat and minerals which Japan bought in Australia had never been more than part paid for by direct exports to Australia. Australian materials were so important to the Japanese that they used credits derived from exports to other countries in order to purchase them. It was a case of triangular trade. Australians saw a very satisfactory export of wool, wheat, tallow, minerals, etc. along one side of the triangle and did not concern themselves as to how the Japanese were getting on along the other sides, from which so much of the payments were drawn. Actually the Japanese were meeting with constant difficulties. Some dozens of countries were imposing trade restrictions against their goods. Wherever the Japanese had a favourable trade balance they found it particularly vulnerable to hostile quotas. This painful experience, and the reasonable logic of the position, drove them to make good any set-backs by a corresponding pressure of exports where, as in the case of Australia, a favourable trade balance of the other country seemed a hostage of welcome, or failing welcome, placed the thick end of the bargaining stick in Japanese hands."

But there was more at stake than multilateral trade. After a few sentences, Mr. Hawker proceeds:—"The spectacular rout of Lancashire made the Ottawa preference seem farcical. It raised an alarming doubt of security for the future of those reciprocal British preferences upon which the prosperity of Australia's agricultural industries depend. Trade with other countries was also upset. As imports from them diminished, the base which they formed for a pyramid of credits to buy Australian products shrank likewise. As Japanese sales grew at the expense of other countries the competition for Australian wool, and other products, narrowed. What the Japanese appear to have failed to understand was that no growth of their purchases

of wool and minerals alone could ever make good to Australia a loss of other markets which took, as well as wool and minerals, fruit, dairy produce, meat, sugar and wine, for which there is no other prospective outlet."¹

The Australian Prime Minister, whose Government was responsible for introducing the Trade Diversion policy and in applying it against Japan, made the same point in effect while not appearing to see the real issue at stake so clearly as Mr. Hawker. He was principally concerned with maintaining Australia's position in the British market. In a broadcast address at the height of the dispute the Prime Minister said: "Unless we can keep the British market open for our surplus primary production, the farmers of Australia, and all but a very small proportion of the graziers of Australia, to-day would face ruin. We can only keep that market open by, as far as is consistent with the maintenance and growth of Australian secondary industry, providing in the Australian market a reasonable opportunity for goods of British manufacture."² What seems to have lain behind the trade diversion policy was the numb fear in official quarters in Australia that if they allowed Japan to rout Lancashire in the sale of textiles to Australia, then they would be subjected by the Government of the United Kingdom to a further substantial contraction of the British market for all types of agricultural produce. The trade diversion policy was a consequence of the Ottawa system: not the Ottawa system in strict accordance of the terms in which it was drawn up, but the Ottawa system as it was at one time feared in the minds of the Australian people that it might be increasingly interpreted by the United Kingdom Government. The episode is in fact an example of the inadequacy of simple and generalised statistics in portraying the effects upon the volume of economic activity of discriminating tariff and quota restrictions. The discouraging indirect effects of the latter tend to put upon traders and producers restrictive influences greater than those which appear in the trade returns. Australia has not yet succeeded in filling completely her quotas for chilled beef in the British market. She has benefited substantially from British policy with regard to butter and from a number of other primary products. But her enterprise has been

¹ Austral-Asiatic Bulletin, Vol. I, p. 7.

² Copland and Jones, *op. cit.*, p. 270.

sapped and her confidence in the future weakened by her increasing dependence upon political bargains if she is to retain her trade.

Moreover, Australia has failed since the introduction of the Ottawa system to find an appropriate economic policy. She turned first to the idea of making bi-lateral trade agreements with any countries where she could get reciprocal benefits by offering them concessions under her three-decker tariffs. But apart from two very small agreements, concerning in each case one commodity only, she has nothing to show for this policy. It has finally come to grief because of the importance of Japan and the Far East in Australian trade. It is not a policy which is practicable when Japan and Australia are bargaining directly with one another. No intermediate tariff between the British preferential rate and the maximum listed rate can be successful in protecting British exporters or local Australian producers against Japanese competition in certain lines of textile production. The disparity in costs is so large that no three-decker tariff system will work. For months before the Trade Diversion policy was applied to Japan, Australia had been trying to make a trade agreement with the Japanese, but she failed because it is practically impossible for Australia to make a trade settlement with Japan of a kind that will be recognised as reasonable by the exporters of this country. And if she makes any other sort of agreement the thin end of the stick will be hers, the thick end of the stick will be ours : the only alternative open to her seemed to be the unhappy Trade Diversion policy.

And yet, Ottawa system or no Ottawa system, in part at least it is to the Far East that Australia must look for a substantial part of the next phase of her economic development. It was the Far East which absorbed important and probably decisive quantities of Australia's primary products at the bottom of the depression. In 1929 Japan obtained only 17 per cent. of her total wheat supplies from Australia : in 1931 and 1932-3 she took 75 per cent. and 81 per cent. respectively ; and Japan has become the second customer of Australia in produce of all kinds since the depression lifted. The Far East as a whole, Manchuria, China, Japan, British Malay and the Dutch East Indies in 1935-6 took 20 per cent. of all Australia's exports, in fact a larger proportion than all Europe excluding the United Kingdom.

It was first as a cushion market for some of Australia's great staple primary products that the Far East became important. Before the world depression, China and Japan took only a negligible proportion of Australia's exports of wheat and flour. But under the stimulus of the very low level of prices during the depression, consumption was encouraged and imports increased substantially. With the recovery in prices, they have fallen back again but Australia has managed to retain a considerably larger proportion of the market, particularly for flour. The Australian share of wheat and flour imports has been:—

In 1929-30, 8 per cent. of the whole.

„ 1930-31, 28 „ „ „

„ 1931-32, 34 „ „ „

„ 1932-33, 40 „ „ „

„ 1934-35, 34 „ „ „

The percentage taken by the Netherlands East Indies also increased so far as wheat is concerned and has almost doubled in the last five years. In wool Japan is now a much more important buyer than France and Germany put together. And in non-ferrous metals and for certain types of iron and steel Japan has now become a very important customer indeed. If there is to be any political stability and economic growth in China when the present troubles are over, the market there too will be of increasing importance to Australia. It will restore that elasticity to her export trade upon which her past development has rested.

Japan is clearly aware of the importance of the issues at stake. She is trying every means she can to decrease her dependence upon Australia's supplies by pressing forward with a five-year plan in Manchuria which includes substantial developments in the production of wheat and wool. The agreement of December, 1936, which terminated the dispute already discussed, did not include the removal of the prohibition of Australian wheat in Manchuria which had been imposed while the dispute was in progress. There was no question of the exclusion of Australian wool from Manchuria, as she exports small quantities to Japan. Technical experts differ in their estimates of the probable degree of success which will attend the efforts which are being made to increase wool production in Manchuria. After twenty years of efforts by the South Manchurian Railway Company and other organisations to improve the

quality of Manchurian sheep, only 12,000 out of 2-3 millions are of improved breed. Moreover, the sheep raisers are mainly Mongolian and there are difficulties of a political kind in handling them. But undoubtedly if the disturbed trade relations between Australia and Japan continue, there will be redoubled efforts by Japan to reduce her dependence upon Australian supplies. This is a contingency which practically no Australian Government can face with equanimity.

Australia's trade with the United States is also of considerable importance to her. There is in America a great potential market for wool and American cars and specialised manufactured goods must be of increasing value to Australia if her economy is to expand. The spectacular developments in connection with the Trade Diversion policy occurred in Australian relations with the Japanese, but equally important ones took place in her relations with America. It was held by the President that the licensing system for the chassis for motor cars which was part of the general policy was trade discrimination of a kind that justified the withdrawal of most-favoured nation treatment which had previously been accorded to Australia under such agreements as the American-French trade treaty of 1936. This was accordingly done in August, 1936, and there the matter remained.¹ America is a really "bad" customer, but Australia has been as powerless in bringing her to book as she was in the case of Japan.

If she cannot succeed in her bi-lateral policy in two such important cases, then it is clear that the policy itself within the scope allowed for it by the Ottawa system stands condemned even by those who are the keenest supporters of protectionism. It is therefore possible that we may find in the needs of the Dominions a useful lever for making breaches in the whole fabric of trade restrictionism. It is only in a general restoration of international trade that Australia can find release from the fears for her future which have ensnared her into the startling episode of trade diversion. If British producers wish to retain their advantages in the Australian market they must throw their weight behind movements designed to restore international trade generally. If they do not do so, no future Australian Government will fight their battles for them and Australia

¹ Copland and Janes, *op. cit.* p. 324.

will turn more and more to self-protection of an extreme kind. The sands are running out fast. It is less than three years to the next Australian election. If we do not put into operation in time for its effects to be felt for twelve months before that election a really effective restriction-destroying policy, we are likely to find that, with the defection of a new Government in Australia from the Ottawa system, we have given away the reality of a healthy economic life in the British Commonwealth as a whole for the forms of economic co-operation which tend to undermine a more valuable and abiding unity.

The Rate of Interest and the Optimum Propensity to Consume

By OSKAR LANGE

1. By introducing liquidity preference into the theory of interest Mr. Keynes has provided us with an analytical apparatus of great power to attack problems which hitherto have successfully resisted the intrusion of the economic theorist. In this paper I propose first to elucidate the way in which liquidity preference co-operates with the marginal efficiency of investment and with the propensity to consume in determining the rate of interest and to point out how both the traditional and Mr. Keynes's theory are but special cases of a more general theory. Further I propose to show how the analytical apparatus created by Mr. Keynes can be used to handle the problem which bothered the under-consumption theorists since the time of Malthus and Sismondi.

2. The economic relations by which the rate of interest is determined can be represented by a system of four equations.¹

The first of these equations is the function relating the amount of money held in cash balances to the rate of interest and to income. This is the liquidity preference function. If M is the amount of money held by the individuals, Y their total income and i the rate of interest we have²:

$$M = L(i, Y) \quad (1)$$

It is convenient to take M and Y as *measured in terms of wage-units*, or of any other *numéraire*. Thus Y is the real income while M is the real value of the cash balances, both

¹ A similar system of equations has been given for the first time by Reddaway, "The General Theory of Employment, Interest and Money," *The Economic Record*, June, 1936, p. 35. While writing this there has come to my notice a forthcoming paper of Dr. Hicks on "Mr. Keynes and the Classics," in the meanwhile published in *Econometrica*, April, 1937, which treats the subject in a similar and very elegant way. The form chosen in my paper seems, however, more adapted for the study of the problems it is concerned with. Cf. also Harrod, "Mr. Keynes and Traditional Theory," *Econometrica*, January, 1937.

² This function is obtained by summation of the liquidity preference functions of the individuals in the same way as a market demand function is obtained from the demand functions of the individuals. It holds only for a given distribution of incomes.

in terms of the *numéraire* chosen. This presupposes, of course, that the ratio of the price of each commodity or service to the price of the commodity or service which is chosen as the *numéraire* is given. These ratios may be thought of as determined by the Walrasian or Paretian system of equations of general economic equilibrium. Thus index numbers are *not* involved in this procedure. We assume that the real value, as defined, of cash balances decreases (or, in the limiting case, remains constant) in response to an increase of the rate of interest and that it increases (or, in the limiting case, remains constant) in response to an increase of real income, i.e., $L_i \leq 0$ and $L_r \geq 0$.

The second equation expresses the propensity to consume. The total expenditure on consumption depends on the total income and, possibly, on the rate of interest. Denoting by C the total expenditure on consumption during a unit of time, we have the function¹:

$$C = \phi(Y, i) \quad (2)$$

where C and Y are measured in wage-units (or in some other *numéraire* chosen). The expenditure on consumption increases in response to an increase of income, though less than the income, i.e., $0 < \phi_Y < 1$, while no general rule can be stated as to the reaction of this expenditure to a change in the rate of interest, so that $\phi_i \gtrless 0$.

The investment function which relates the amount invested per unit of time to the rate of interest and to the expenditure on consumption provides us with a third equation. If I is the investment per unit of time the function is:

$$I = F(i, C) \quad (3)$$

Both I and C are measured in wage-units. The investment function is based on the theorem that the amount of investment per unit of time is such as to equalise the rate of net return on that investment (the marginal efficiency in Mr. Keynes' terminology) to the rate of interest. This rate of net return is derived from the rate of net return (marginal efficiency) on capital but it is not identical with it.² The

¹ This function is the sum of the functions expressing the propensity to consume for each individual. It holds only for a given distribution of incomes.

² They are frequently confused. However, the marginal efficiency of capital relates the rate of net return to a *stock* of capital while the marginal efficiency of investment relates it to a *stream* of investment per unit of time. As to how the marginal efficiency of investment is related to the marginal efficiency of capital cf. a forthcoming paper by Mr. Lerner. It also ought to be observed that the investment function holds only for a given capital equipment and for a given distribution of the expenditure for consumption between the different industries.

lower the rate of interest the larger the investment per unit of time, i.e., $F_i < 0$. Investment per unit of time depends, however, not only on the rate of interest but also on the expenditure on consumption. For the demand for investment goods is *derived* from the demand for consumers' goods. The smaller the expenditure on consumption the smaller is the demand for consumers' goods and, consequently, the lower is the rate of net return on investment. Thus, the rate of interest being constant, investment per unit of time is the larger the larger the total expenditure on consumption, i.e., $F_c > 0$.

Finally we have the identity :

$$Y \equiv C + I \quad (4)$$

which provides us with the fourth equation.¹

If the amount of money M (in wage-units) is given these four equations determine the four unknowns, i , C , I and Y . Alternatively, i may be regarded as given (for instance, fixed by the banking system) and M as determined by our system of equations. These equations determine also the income-velocity of circulation of money which is $\frac{Y}{M}$.² It

must, however, be remembered that C , I and Y are measured in terms of a *numéraire* (wage-units). If we want them to be expressed in money we need an additional equation which expresses the money price of the commodity or service chosen as *numéraire* (a unit of labour in our case). If w is this money price and Q the quantity of money we have :

$$Q = wM \quad (5)$$

which is equivalent to the traditional equation of the quantity theory of money.

3. The process of determination of the rate of interest according to the four equations above is illustrated by the three following diagrams.

Fig. 1 represents the relation between the demand for cash balances and the rate of interest. The quantity of

¹ This identity is the sum of the budget equations of the individuals. It can also be written in the form $Y - C \equiv I$ which expresses the equality of investment and the excess of income over expenditure on consumption, i.e., saving. The identical equality of investment and saving holds for investment and saving actually performed. Investment or saving decisions can be different. The identity above states, however, that, whatever the decisions, income is bound to change so as to make equal saving and investment actually realised.

² It is interesting to notice that the income-velocity resulting from these equations is the "hybrid" corresponding to the definition of Professor Pigou (cf. *Industrial Fluctuations*, 1927, p. 152) and of Mr. Robertson (*Money*, new edition, 1932, p. 38) and not the ratio of income to income deposits only which Mr. Keynes calls income-velocity (cf. *A Treatise on Money*, Vol. II, pp. 24-25).

money (in wage-units) being measured along the axis OM and the rate of interest along the axis Oi , we have a *family*

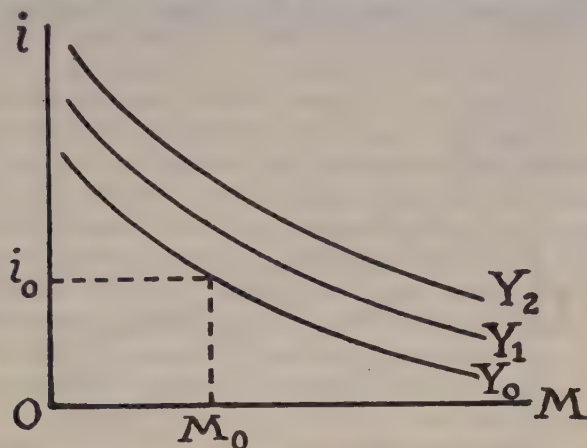


Fig. 1

of liquidity preference curves: one for each level of total income (measured in wage-units). The greater the total income the higher up is the position of the corresponding curve.

Further we have a family of curves (one for each rate of interest) representing the relation between income and expenditure on consumption (Fig. 2). Income is measured along OY and expenditure on consumption along OC .

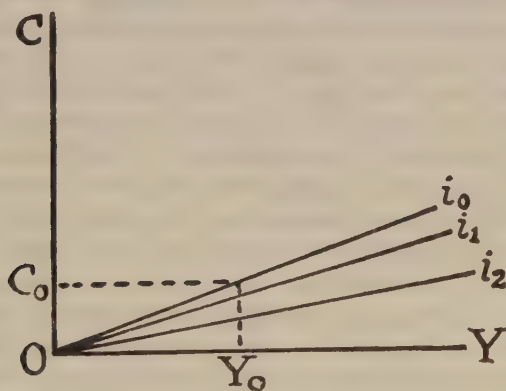


Fig. 2

The relation between investment and the rate of interest is represented by Fig. 3. Measuring investment per unit

of time along the axis OI and the rate of interest along Oi we have a family of curves indicating the investment corresponding to each value of the rate of interest.

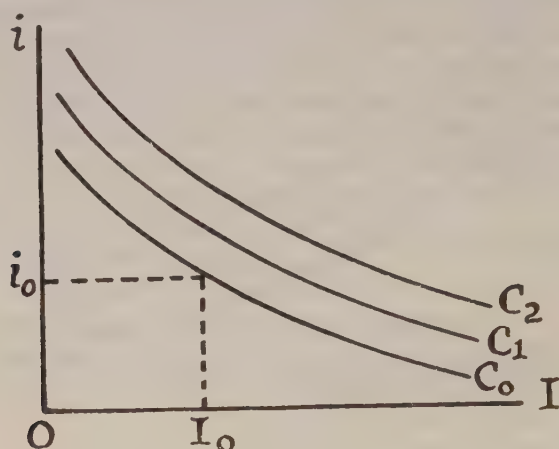


Fig. 3

These curves represent the marginal net return (marginal efficiency) of each amount of investment per unit of time. It is important to notice that there is a separate curve for each level of expenditure on consumption. The greater the expenditure on consumption the higher up is the position of the corresponding curve.

To study the process of determination of the rate of interest let us start with a given amount of money (OM_0 in Fig. 1) which is kept constant throughout the process and with a given initial income Y_0 . The position of the liquidity preference curve being determined by the level of income (in Fig. 1 the curve corresponding to the income Y_0), the amount of money determines the rate of interest, say i_0 . This rate of interest determines the position of the curve in Fig. 2 representing the propensity to consume. This position being determined, we get the expenditure on consumption C_0 corresponding to the initial income Y_0 . The expenditure on consumption being given, the position of the marginal efficiency curve in Fig. 3 is determined (i.e., the curve corresponding to C_0). When this position is determined the rate of interest i_0 determines the amount I_0 of investment per unit of time. We have thus the expenditure on consumption and the amount of investment.

But the sum of these two is equal to the total income (*vide* equation 4). If it happens so that $C_o + I_o$ is equal to the initial income Y_o the system is in equilibrium. Otherwise the liquidity preference curve in Fig. 1 changes its position so as to correspond to the new level of income $C_o + I_o$. This gives us a new rate of interest. As a result of this and of the changed income we get a new level of expenditure on consumption. This in turn changes the position of the marginal efficiency curve in Fig. 3 and the new rate of interest determines another amount of investment which, together with the expenditure on consumption, determines a third level of total income. As a result the liquidity preference curve shifts again, etc. This process of *mutual adjustment* goes on until the curves in our three diagrams have reached a position compatible with each other and with the quantity of money given, i.e., until equilibrium is attained.¹

4. Let us now consider how changes in the curves of the marginal efficiency of investment and in the curves representing the propensity to consume affect the rate of interest.

If the marginal efficiency curves are all shifted upwards (which, ultimately, must be due to an increase of the marginal net productivity of capital), then a larger amount of investment corresponds to any given rate of interest and expenditure on consumption. Therefore total income increases and the curve of liquidity preference in Fig. 1 shifts upwards. This causes a rise of the rate of interest. Thus, just as in the traditional theory, an increase in the marginal productivity of capital is accompanied by a rise of the rate of interest. The reverse happens when the marginal productivity of capital declines.

On the other hand, a decrease in the propensity to consume (or, in other words, an increase in the propensity to save) is accompanied by a fall of the rate of interest. For with a given initial income and a given rate of interest the expenditure on consumption is now lower. This causes the marginal efficiency curve in Fig. 2 to shift downward and a lower quantity of investment corresponds to any given rate of interest. Total income decreases both as a direct result of the decreased expenditure on consumption and

¹ If this process of adjustment involves a time lag of a certain kind a cyclical fluctuation, instead of equilibrium, is the result. Cf. Kalecki, "A Theory of the Business Cycle," *Review of Economic Studies*, February, 1937.

because of the diminished quantity of investment. Thus a downward shift of the liquidity preference curve in Fig. 1 takes place. The consequence is a fall of the rate of interest. In a similar way an increase in the propensity to consume raises the rate of interest.

Thus the two traditional statements that the rate of interest rises together with the marginal net productivity of capital, and vice versa, and that it moves in the opposite direction to the propensity to save, hold fully in our generalised theory. Two limiting cases, however, deserve special attention.

The theory put forward is quite general and formal. The actual reactions, however, depend on the concrete shape of the functions (1), (2) and (3). We are concerned at present with the consequences of different shapes of the liquidity preference function. For the general case it has been assumed that the demand for liquidity is a decreasing function of the rate of interest and an increasing function of total income. The demand for liquidity (i.e., for cash balances) has thus two elasticities: an interest-elasticity which is negative and an income-elasticity which is positive. These two elasticities determine the reaction of the rate of interest to changes in the marginal efficiency of investment (which is correlated to the marginal net productivity of capital) and in the propensity to consume; for the reaction of the rate of interest to these is due to the influence which the change of income caused by them exerts upon liquidity preference. The greater the income-elasticity of the demand for liquidity the more the curve of liquidity preference is shifted when income changes and, consequently, the greater is the reaction of the rate of interest. The shift of the liquidity preference curve changes the demand for liquidity corresponding to any given rate of interest. If, however, the amount of money (in wage-units) is fixed, the rate of interest must change so as to equalise the demand for liquidity to the quantity of money available. The change of the rate of interest which thus follows is the greater the smaller the interest-elasticity of the demand for liquidity. Therefore, the reaction of the rate of interest is the greater the smaller the interest-elasticity of the demand for liquidity.

In the special case in which the income-elasticity of the demand for liquidity is zero the rate of interest does not

react at all to changes other than in the quantity of money (measured in wage-units). The demand for liquidity is in this case a function of the rate of interest alone:

$$M = L(r) \quad (1a)$$

There is but one curve of liquidity preference and the amount of money determines the rate of interest independently of the level of total income. Changes in the marginal efficiency of investment and in the propensity to consume do not affect the rate of interest at all. The whole brunt of such changes has to be borne by the other variables of the system (i.e., expenditure on consumption, investment and income). The same result is also reached when the interest-elasticity of the demand for liquidity is infinite. In this case, too, the rate of interest does not react to changes in the marginal efficiency of investment or in the propensity to consume. For the change of the rate of interest which is necessary to balance a given change in the demand for liquidity caused by a change of total income is nil in this case. This is Mr. Keynes' theory. Since Mr. Keynes recognises *expressis verbis* the dependence of the demand for liquidity on total income¹ it is obviously the last case he must have in mind.

The other special case is when the interest-elasticity of the demand for liquidity is zero. The demand for cash balances is in this case a function of income alone:

$$M = L(Y) \quad (1b)$$

Both Y and M being measured in wage-units (or in any other *numéraire*, for instance, wheat²) this equation states simply the proportion of their real income people hold in cash (in real balances). If this proportion is regarded as constant our function becomes:

$$M = kY$$

(where k is a constant) which is the well known Cambridge equation of the quantity theory of money. Taking into account equation (5) this can be written $Q = kYw$, or $Q = wL(Y)$ in the more general case, where Q is the quantity of money and w is the money price of the commodity or service which has been chosen as *numéraire*. The latter being given, the total income is determined by the quantity of money. Total income being given, the rate of interest is determined exclusively by the equations (2), (3) and (4),

¹ Cf. *The General Theory of Employment, etc.*, pp. 171-172 and pp. 199 *et seq.*

² The reader will be reminded that Marshall and Professor Pigou have used wheat as a *numéraire* in this connection. *Vide* Marshall, *Money Credit and Commerce*, p. 44, and Pigou, *Essays in Applied Economics*, p. 177.

i.e., by the propensity to consume, by the marginal efficiency of investment (which in turn depends on the marginal net productivity of capital), and by the condition that investment is equal to the excess of income over expenditure on consumption (i.e., saving). This is the traditional theory of interest.

Thus both the Keynesian and the traditional theory of interest are but two limiting cases of what may be regarded to be the general theory of interest.

5. It is a feature of great historical interest that the essentials of this general theory are contained already in the work of Walras.

Indeed, the demand for liquidity appears in Walras as the *encaisse désirée*. Walras is quite explicit about the fact that the demand for liquidity is a function of the rate of interest. This dependence is expressed as early as in the second edition of his *Eléments d'économie politique pure* which was published in 1889. "In a society—he writes—where money is kept in cash from the moment when it is received until the day when it is given into payment or loaned out, money renders few services and those who keep it, producers or consumers, lose needlessly the interest on the capital which it represents." ("Dans une société où on garde la monnaie en caisse depuis le moment où on la reçoit jusqu'au jour où on la donne en paiement ou jusqu'au jour où on la prête, la monnaie rend peu de services, et ceux qui la détiennent, producteurs ou consommateurs, perdent inutilement l'intérêt du capital qu'elle représente.")¹ This is emphasised even more in his *Théorie de la Monnaie* where we read about the service yielded by a given *encaisse monétaire*: "its satisfaction is obtained at the price of interest and this is why the effective demand for money is a decreasing function of the rate of interest" ("sa satisfaction se paie au prix d'un intérêt et c'est pourquoi la demande effective de monnaie est une fonction décroissante du taux d'intérêt").² He goes on, to quote again from the second edition of the *Eléments*, saying: "Suppose that on a certain day the existing quantity of money Q_u has diminished or that the demand for cash H which represents the utility of money has increased Equilibrium will be re-established on the next day on the market at a new

¹ P. 382.

² P. 95 of the reprint in *Etudes d'économie politique appliquée* (published in Lausanne in 1898). This passage does not occur in the original edition in form of a separate book which was published in 1886 (Lausanne).

and higher rate of interest at which the demand for cash will be reduced." ("Supposons qu'un jour la quantité existante de monnaie Q_u ait diminué ou que l'encaisse désirée H représentant l'utilité de la monnaie ait augmenté . . . L'équilibre ne s'établirait, le lendemain, sur le marché, qu'à un nouveau taux d'intérêt plus élevé auquel l'encaisse désirée se réduirait.")¹. Walras also uses the device of expressing the demand for cash balances in real terms. It is a certain real purchasing power over which the individual wants to have command and he expresses it in terms of a *numéraire*.² If H is the demand for liquidity in terms of the *numéraire* chosen and Q_u is the amount of money in existence, then the price p_u of money in terms of the *numéraire* is determined by the equation $Q_u p_u = H$, which is analogous to the equation (5) above.³ Walras fails, however, to indicate whether the *encaisse désirée* depends also on the level of real income. But whatever the shortcomings of his presentation, the liquidity preference function has been indicated clearly by Walras.

Our remaining three equations are also contained in the system of Walras. There is, first of all, the propensity to save (instead of our propensity to consume). Saving is defined, as by Mr. Keynes, as the excess of income over consumption (*l'excédent du revenu sur la consommation*).⁴ Now this excess of income over consumption is conceived by Walras to be a function of both the rate of interest and income. He expresses the propensity to save by an equation and states explicitly that this equation "gives the excess of income over consumption as a function of the prices of the productive services and of consumers' goods and of the rate of interest" ("donnant *l'excédent* du revenu sur la consommation en fonction des *prix* des services et des produits consommables et du *taux* du revenu net").⁵ By introducing the prices of all commodities he brings income

¹ P. 383. In the last editions of the *Eléments* the exposition, though put into mathematics, is somewhat obscure. Walras introduces also the question of liquidity (i.e., of stocks) in other commodities. Of each commodity a stock is kept which renders a "*service d'approvisionnement*" (service of storage). The rate of interest is the cost of this service. Cf. *Eléments*, 4th ed., 1900, pp. 179, 298, 303.

² Pp. 377-78 of 2nd ed. and *Théorie de la Monnaie* (as reprinted in *Etudes d'économie politique appliquée*), p. 95.

³ P. 378 and p. 383 of 2nd ed.

⁴ P. 281 of first edition published in 1874 (p. 269 of second ed. and p. 249 of final ed.). Walras uses throughout the term *excédent* and the word *épargne* is reserved to denote net saving. Cf. p. 282 of first ed. (p. 270 of 2nd ed. and p. 250 of final ed.).

⁵ P. 271 of 2nd ed. "*Taux du revenu net*" must be translated by "rate of interest" in this connotation.

indirectly into the equation expressing the propensity to save. His equation thus corresponds to our equation (2). As a counterpart to our investment function Walras has an equation which determines the total value of "*capitaux neufs*" produced. This value is determined by the condition that the selling price of the *capitaux neufs* (which is equal to the capitalised value of their net returns) is equal to their cost of production.¹ This equation determines the total volume of investment corresponding to any given rate of interest. Unfortunately, Walras fails to indicate on what the net return of the *capitaux neufs* depends. He takes it just for granted and as a consequence there is no relation between their net return and the expenditure on consumption.

Finally Walras expresses in a separate equation the equality of the value of the *capitaux neufs* and the excess of income over consumption.² This, however, is *not* equivalent to our equation (4) which states the equality of investment and the excess of income over consumption. For there is an important difference. In our system, as in the theory of Mr. Keynes, equation (4) is an identity. Whatever the investment and saving *decisions* are, the volume of total income always adjusts itself so as to equalise saving and investment *actually performed*.³ This is a simple budget relationship, for the individuals' incomes are equal to the sum of expenditure on consumption and investment. Walras, however, treats the equality of investment and saving not as an identity but as a genuine equation which holds true only in a position of equilibrium. Hence his investment (value of the *capitaux neufs*) and saving (excess of income over consumption) are to be interpreted as *decisions* which finally are brought into equilibrium by a change in the rate of interest and in total income.⁴ But this equation does not show how total income changes so as to bring saving actually performed always into equality with investment.

This is done by our identity (4) which corresponds to

¹ Cf. p. 284 of first ed. (pp. 246-7 and p. 253 of final ed.).

² P. 284 of first ed. (p. 252 of final ed.).

³ It ought to be mentioned here that this has been recognised by many economists before Mr. Keynes. If investment decisions exceed saving decisions "forced saving" takes place according to a widely accepted doctrine. And Mr. Robertson has pointed out (cf. *Money*, London, 1928, pp. 93-97) that if saving decisions exceed investment decisions the excess cannot be saved. It becomes "abortive."

⁴ Pp. 286-7 of 2nd ed. (pp. 266-67 of final ed.). In the process of *râtonnements* described by Walras all the prices change and thus total income changes, too,

the sum of the budget equations in the Walrasian system and shows how expenditure on consumption and investment *determine* the total income. When this budget relationship is taken account of, there is no need any more for a separate equation indicating the equilibrium of saving and investment decisions based on some *given* income, however defined. All the relevant relations are expressed by our equations (2), (3) and (4). Thus Mr. Keynes' apparatus involves a considerable simplification of the theory.

6. Having investigated the consequences which the introduction of liquidity preference has for the formulation of the theory of interest, let us see how the general theory outlined above can be applied to solve the problem which is the concern of all theories of underconsumption. Mr. Keynes has scarcely done justice to what is the core of the argument of those theories. "Practically—he writes—I only differ from these schools of thought in thinking that they may lay a little too much emphasis on increased consumption at a time when there is still much social advantage to be obtained from increased investment. Theoretically, however, they are open to the criticism of neglecting the fact that there are *two* ways to expand output."¹ Mr. Keynes treats investment and expenditure on consumption as two *independent* quantities and thinks that total income can be increased indiscriminately by expanding *either* of them. But it is a commonplace which can be read in any textbook of economics that the demand for investment goods is *derived* from the demand for consumption goods. The real argument of the underconsumption theories is that investment *depends* on the expenditure on consumption and, therefore, cannot be increased without an adequate increase of the latter, at least in a capitalist economy where investment is done for profit.

Few underconsumption theorists ever maintain that *any* saving discourages investment.² Generally they maintain that up to a certain point saving encourages investment while it discourages it if this point is exceeded.³ This is the theory of oversaving. If people would spend their whole income on consumption, investment would obviously

¹ *The General Theory of Employment, etc.*, p. 325.

² The most prominent among those who did so was Rosa Luxemburg in her famous book *Die Akkumulation des Kapitals* (Berlin, 1912).

³ *Vide*, for instance, Hobson, *The Industrial System*, London, 1910, pp. 53-54.

be zero, while the demand for investment would be zero too, if they consumed nothing. Thus mere common sense suggests that there must be somewhere in between an *optimum* propensity to save which maximises investment. But no underconsumption theorist ever has shown what this optimum is and how it is determined. The problem, however, was put forward with unsurpassed clarity already by Malthus: "No considerable and continued increase in wealth could possibly take place without that degree of frugality which occasions, annually, the conversion of some revenue into capital, and creates a balance of produce over consumption; but it is quite obvious . . . that the principle of saving, pushed to excess, would destroy the motive to production . . . If consumption exceeds production, the capital of the country must be diminished, and its wealth must be gradually destroyed from its want of power to produce; if production be in great excess above consumption, the motive to accumulate and consume must cease from the want of will to consume. The two extremes are obvious; and it follows that there must be some intermediate point, though the resources of political economy may not be able to ascertain it, where taking into consideration both the power to produce and the will to consume, the encouragement to the increase of wealth is greatest."¹

The general theory of interest outlined in this paper enables us to solve this problem and to determine the optimum propensity to save which maximises investment. Since investment per unit of time is a function of both the rate of interest and expenditure on consumption a decrease of the propensity to consume (increase in the propensity to save) has a twofold effect. On the one hand the decrease of expenditure on consumption discourages investment, but the decrease in the propensity to consume also causes, as we have seen, a fall of the rate of interest which encourages investment on the other hand. The optimum propensity to consume is that at which the encouraging and the discouraging effect of a change are in balance.

The condition of such a balance is easily found. A change of the propensity to consume is mathematically a change of the *form* of the function (2) in our equations. We want to discover the conditions this function has to satisfy in

¹ *Principles of Political Economy*, London, 1820, pp. 8-9 (Introduction). Cf. also pp. 369-70.

order to maximise investment. Let δC be the variation of expenditure on consumption and δi the variation of the rate of interest which are caused by the change of the propensity to consume. Recalling the investment function (3), which is $I = F(i, C)$, the condition that investment be a maximum is then :

$$\delta I = F_i \delta i + F_c \delta C = 0 \quad (6)$$

where δI is the corresponding variation of investment.

From equation (4) we derive the variation of total income caused by the change of the propensity to consume :

$$\delta Y = \delta C + \delta I$$

and since $\delta I = 0$ when investment is a maximum we have in the maximum position :

$$\delta Y = \delta C \quad (7)$$

Now the change of the rate of interest due to the change of the propensity to consume can be obtained from equation (1), i.e., from the liquidity preference function. We have¹ :

$$\delta M = L_i \delta i + L_r \delta Y \quad (8)$$

If the sum of real balances available, i.e., the quantity of money measured in wage-units or in any other *numéraire*, is assumed to be constant² this reduces to :

$$L_i \delta i + L_r \delta Y = 0 \quad (8a)$$

whence :

$$\delta i = -\frac{L_r}{L_i} \delta Y \quad (9)$$

By substitution of (9) and (7) in (6) we arrive at the equation :

$$-F_i \frac{L_r}{L_i} \delta C + F_c \delta C = 0$$

¹ The liquidity preference function holds only for a given distribution of incomes (cf. footnote 2 on p. 12 above). Similarly the investment function holds only for a given distribution of the expenditure for consumption between the different industries, for even if the total expenditure on consumption remains unchanged a shift of expenditure from goods requiring less to goods requiring more capital to produce, or vice versa, necessarily affects investment. Equations (6) and (8) in the text presuppose, therefore, that changes in the distribution of incomes and in the direction of consumers' expenditure to different industries are either absent, or that their effect on total investment and on the total demand for liquidity is of second order magnitude and can thus be neglected. Since a change of the propensity to consume certainly produces changes in the distribution of incomes and of consumers' expenditure the second assumption is the only realistic one. A more precise theory would have to take into account the effect of these changes, too.

² If the money wage (or, more generally, the money price of the *numéraire* chosen) is constant, this means that the nominal quantity of money is constant, too. If not, the nominal quantity of money has to change proportionally to the money price of the *numéraire*. If, however, labour is not regarded as a homogeneous factor the use of labour-units as *numéraire* involves really the use of a particular index number, i.e., the labour standard, and our assumption amounts to assuming that the purchasing power of money in terms of the labour standard is constant.

which can be transformed into :

$$-\frac{L_Y}{L_i} = -\frac{F_c}{F_i} \quad (10)$$

This equation, together with the equations (1), (3) and (4) of our system, determines the optimum propensity to consume under the assumption that the amount of money (measured in wage-units) is constant.¹

Only such forms of the function representing the propensity to consume which satisfy this equation provide a maximum investment. A very simple economic interpretation can be given to the equation obtained. The right hand side of the equation is the marginal rate of substitution between a change of the rate of interest and a change of the expenditure on consumption as inducements to invest. The left hand side is the marginal rate of substitution between a change of the rate of interest and a change of real income as determining the demand for liquidity. The optimum propensity to consume is thus determined by the condition that *the marginal rate of substitution between the rate of interest and total income as affecting the demand for liquidity is equal to the marginal rate of substitution between the rate of interest and expenditure on consumption as inducements to invest.*²

¹ If the amount of money (as defined in the text) is allowed to change a more general condition is obtained. For this purpose we must add to our system of equations a supply function of money. Let this function be :

$$M = \psi(i, Y)$$

where M and Y are measured in terms of wage-units. We have then :

$$\delta M = \psi_i \delta i + \psi_Y \delta Y$$

and taking into account equation (8) in the text we obtain :

$$\psi_i \delta i + \psi_Y \delta Y = L_i \delta i + L_Y \delta Y$$

which can be written in the more convenient form :

$$(\psi_Y - L_Y) \delta Y = (L_i - \psi_i) \delta i$$

whence we get :

$$\delta i = \frac{\psi_Y - L_Y}{L_i - \psi_i} \delta Y$$

Substituting this and (7) in (6) we arrive at :

$$F_i \frac{\psi_Y - L_Y}{L_i - \psi_i} \delta C + F_c \delta C = 0$$

which is, finally, transformed into :

$$\frac{\psi_Y - L_Y}{L_i - \psi_i} = -\frac{F_c}{F_i} \quad (10a)$$

This is the most general form of the equation which determines the optimum propensity to consume. Equation (10) obtained in the text is a special case of it when $\psi_Y = 0$ and $\psi_i = 0$.

² The economic interpretation of equation (10a) is similar to that of equation (10), only the left hand side is here the marginal rate of substitution not along a curve of equal liquidity (isolidiquity curve; *vide* below) but along the curve corresponding to the equation :

$$\psi(i, Y) = L(i, Y)$$

Thus the left hand side of (10a) is the marginal rate of substitution between the changes

It is convenient to have a graphic illustration of this condition. On Fig. 4 we draw a family of indifference curves indicating the possible variations of the rate of interest and of the expenditure on consumption which do not change the level of investment per unit of time. We

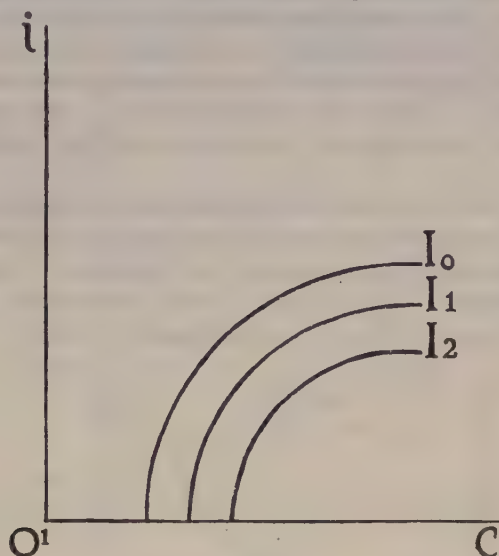


Fig. 4

may call them *isoinvestment curves*. The expenditure on consumption being measured along the axis $O'C$ and the rate of interest along $O'i$ these curves slope upward¹ and the greater the level of investment the more to the right is the position of the corresponding isoinvestment curve². The curves can be expected to be concave downwards, for the stimulus to invest exercised by each successive increment of expenditure on consumption is weaker. This is explained by the increasing prices of the factors of production which diminish the net return derived by entrepreneurs from successive increments of expenditure on consumption (the curves of marginal efficiency of investment in Fig. 3 are of the rate of interest and of total income which are compatible with the maintenance of the equality of the supply of and the demand for money. The supply function of money depends on the behaviour of the monetary system.

¹ The slope of these curves is $-\frac{F_c}{F_i}$. Since $F_c > 0$ and $F_i < 0$ the slope is positive.

² There are certain combinations of the expenditure on consumption and of the rate of interest at which the existing capital is just maintained by replacement. They determine the curve corresponding to zero investment (i.e., the curve I_0 in Fig. 4). All curves to the right of it correspond to positive and all to the left correspond to negative investment.

shifted upwards less and less). Thus the greater the expenditure on consumption the greater is the increment of it which is necessary to compensate a given rise of the rate of interest. Finally, we reach a point where a further increase of the expenditure on consumption fails entirely to stimulate investment. This happens when the elasticity of supply of the factors of production has become zero, so that an increase of the expenditure on consumption only raises their prices. Thus the isoinvestment curves become horizontal to the right of a certain critical value of the abscissa.¹

On Fig. 5 we draw an indifference curve which represents all the variations of the rate of interest and of total income which do not affect the demand for liquidity (total income and the demand for liquidity being expressed in wage-units). We may call it the *isoliquidity curve*. Since the

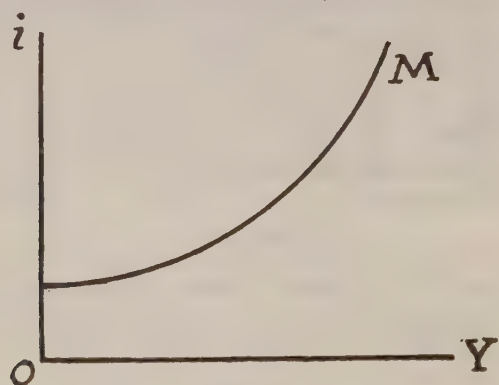


Fig. 5

amount of money is assumed to be given we have only one such curve (the curve *M* in Fig. 5). It slopes upward² and generally it may be expected to be convex downward, for as real income increases its marginal utility decreases and the less felt is the loss of interest income due to keeping money in cash balances. Therefore the increase of the rate of interest which is necessary to compensate the effect

¹ $-\frac{F_c}{F_i} = 0$ when $F_c = 0$.

² The slope of the curve is $-\frac{L_Y}{L_i}$. It is positive because $L_Y > 0$ and $L_i < 0$. In the limiting cases, however, where either $L_Y = 0$ or $L_i = 0$ we have either $-\frac{L_Y}{L_i} = 0$ or $-\frac{L_Y}{L_i} = \infty$ and the isoliquidity curve degenerates into a horizontal or vertical straight line.

a given increment of real income has on the demand for liquidity is the greater the income.

The optimum propensity to consume can now be determined in a simple way by combining the diagrams of Fig. 4 and Fig. 5. Equation (10) states that the slope of the isoliquidity curve has to be equal to the slope of the isoinvestment curve (*vide* the point P in Fig. 6). But the position of the origins O and O' in the combined diagram

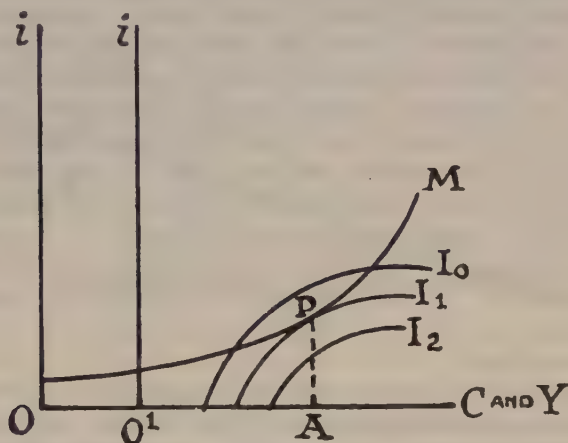


Fig. 6

is not arbitrary. For OO' is the difference between total income and expenditure on consumption, i.e., represents the level of investment. Thus to each level of investment there belongs a special length of OO' . The optimum propensity to consume is, therefore, obtained by superimposing Fig. 5 upon Fig. 4 (as in Fig. 6) and moving it horizontally until the isoliquidity curve becomes tangent to the isoinvestment curve whose index (i.e., level of investment) is equal to the length of OO' . OO' is then the maximum investment, $O'A$ and OA are the expenditure on consumption and the total income which correspond to it. If the isoinvestment curves are concave and the isoliquidity curve is convex downward there exists only one isoinvestment curve which satisfies this condition and the solution is unique¹.

¹ The graphic solution indicated in Fig. 6 is also applicable to the general case where the quantity of money (in terms of wage-units) is not constant. As shown in the footnotes 1 and 2 on p. 26 the equation (10a) is substituted in this case for the equation (10). Instead of the isoliquidity curve we get a curve corresponding to the equation $\psi(i, Y) = L(i, Y)$. It is a projection on the Yi plane of the curve resulting from the intersection of the two

From Fig. 6 we obtain the expenditure on consumption $O'A$ and the total income OA which correspond to maximum investment and which are, as we have seen, uniquely determined. Plotting them on a diagram (*vide* Fig. 7) we obtain a point R through which the curve representing the propensity to consume has to pass. Thus the function

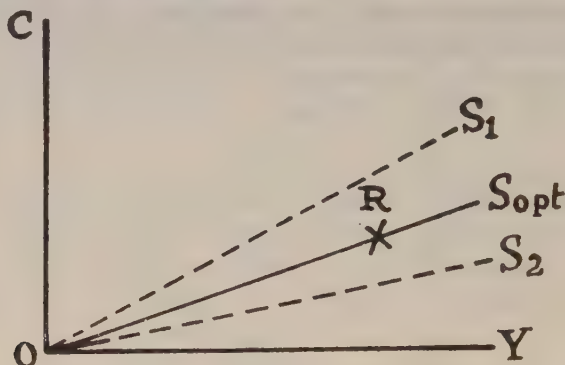


Fig. 7

expressing the optimum propensity to consume is determined only by *one* point through which it has to pass. *Any* function which passes through the point R maximises investment. Any function, however, which does not pass through R makes total investment smaller. Generally we may expect that a decrease of the propensity to consume (i.e., an increase of the propensity to save) leads us from curves which pass above R to curves which pass below R (e.g., the curves S_1 and S_2 in Fig. 7). As long as they pass above R the propensity to consume is above optimum, when they pass below R it is below optimum. Maximum investment is attained when we hit upon a curve which passes through R (e.g., the curve S_{opt} in Fig. 7). This is a curve of optimum propensity to consume. Any change of the shape of the curve which does not affect its passing through R is irrelevant.

7. Let us now apply the result obtained to two special cases.

When either the income-elasticity of the demand for liquidity is zero or the interest-elasticity of the demand surfaces representing the supply and the demand for money respectively (the isoliquidity curves are a special case of it obtained when the supply surface of money is a plane parallel to the $\mathcal{Y}$'s plane). The shape of the curve depends now also on the form of the supply function of money. The graphic solution is obtained as in the text by moving the diagram of this curve horizontally until the curve becomes tangent to the isoinvestment curve corresponding to the level of investment equal to OO' .

for liquidity is infinite, which is the case corresponding to Mr. Keynes' theory, we have either $L_r = 0$ (and $L_i \neq 0$) or $L_i = \infty$ (and $L_r \neq 0$). It follows immediately from equation (10) that $F_c = 0$ in either case.¹ The economic interpretation is simple. As we have seen, in this case a change in the propensity to consume does not affect the rate of interest at all. The rate of interest remaining constant, the optimum propensity to consume is *when the expenditure on consumption is such that a further increase does not any more increase the marginal efficiency of investment*. It has been mentioned already that this happens when the elasticity of supply of factors of production becomes zero, so that an increase of the expenditure on consumption only raises their prices but cannot increase investment. This implies the absence of even voluntary unemployment of factors of production. If involuntary unemployment of a factor is defined by its supply being infinitely elastic, it is absent whenever the elasticity of supply is finite. A zero elasticity of supply, however, means that there are no more factors which would offer their services if the remuneration were greater, i.e., are voluntarily unemployed. Until this stage is reached any increase in the propensity to consume stimulates investment.² This fits well into the scheme of Mr. Keynes' theory.

The other special case is when the interest-elasticity of the demand for liquidity is zero which is, as we have seen, the case of the traditional theory. Then $L_i = 0$ (and $L_r \neq 0$) and by rewriting equation (10) in the form:

$$-\frac{L_i}{L_r} = -\frac{F_i}{F_c}$$

we obtain $F_i = 0$ for this case. *Any decrease in the propensity to consume stimulates investment* by causing an appropriate fall of the rate of interest. The propensity to save can never be excessive, for the rate of interest falls always sufficiently to make room for additional investment. The only limit is when a further decrease of the rate of interest stops increasing investment ($F_i = 0$), i.e., when

¹ It seems, however, highly doubtful that $L_i = \infty$ over the whole range of the liquidity preference function.

² In the general case where the quantity of money is allowed to vary the same result is reached when $\psi_r = L_r$ (vide equation (10a)). In this case the income elasticity of supply of money is equal to the income-elasticity of the demand for liquidity; each change of total income is balanced by exactly such a change of the supply of money that the rate of interest remains constant.

the net return on investment becomes zero and the rate of interest is zero, too.

In the general case the optimum propensity to save is somewhere between these two limits and *it is the greater the greater the income-elasticity and the smaller the interest-elasticity of the demand for liquidity*. For the fall of the rate of interest due to an increase in the propensity to save is the greater the greater is the first and the smaller is the second of these two elasticities. The optimum propensity to save is also the greater the greater the elasticity of investment with respect to the rate of interest and the smaller the elasticity of investment with respect to expenditure on consumption.

Thus we arrive at the result that, with the exception of the special case covered by the traditional theory of interest, there exists an optimum propensity to save which depends on the shape of the liquidity preference and of the investment functions. This imposes a maximum limit on investment per unit of time and any attempt to exceed it by raising the propensity to save above its optimum frustrates itself by leading to a diminution of investment. In a society where the propensity to save is determined by the individuals there are no forces at work which keep it automatically at its optimum and it is well possible, as the underconsumption theorists maintain, that there is a tendency to exceed it. Whether this is actually the case is a matter for empirical investigation and cannot be answered by the economic theorist.

The optimum propensity to save is, however, defined only with regard to a given quantity (or more generally: to a given supply function) of money. Therefore, if the propensity to save does exceed its optimum it need not be curbed to avoid its evil consequences. It can be made to benefit economic progress by an appropriate monetary policy which increases the quantity of money sufficiently to reduce the rate of interest so as to compensate the discouraging effect a high propensity to save has on investment.¹ How far such a policy is possible depends on the structure of the monetary and of the whole economic system.

¹ The requirement of an increase of the quantity of money to counteract an excessive propensity to save is *not* in contradiction with the teaching of Professor Davidson, Professor Hayek and Mr. Robertson that technical progress does not require an increase of the quantity of money to avoid deflation. If the increase in the propensity to save is accompanied by technical progress which increases the marginal efficiency of investment, investment is not discouraged and no increase of the quantity of money is necessary.

The Subsidy to British Farming in Respect of Income Tax

By DUNCAN BLACK

SECTION I. AN ANALYSIS.

I. A PERSON in Great Britain whose income is earned in any occupation other than farming is assessed for purposes of Income Tax on the amount of income he earns during a particular period of a year. If, however, the person's income is earned in the occupation of farming then he may choose to be assessed on the income of either of two successive periods of a year, on the income of the year when the assessment is made or on the income of the preceding year; or else he may choose to be assessed on an amount of income equal to the value of the rental that he pays for his farm land and buildings.¹ A farmer has these three alternative assessments to choose from: any other class of persons has no choice but to pay Income Tax on a particular assessment of income, namely, on the income of the accounting year preceding the year of the assessment.

The concessions that a farmer receives in payment of Income Tax therefore are two: he may pay on a rental basis or on the income of the present year instead of on that of the preceding year. The practical importance of each of these concessions is considerable. Many farmers choose to be assessed on a rental basis. Many also choose to be assessed on the income of the year when the assessment is made. This is made clear by a Parliamentary reply of the Chancellor of the Exchequer, Sir J. Simon, to a question by Mr. Drewe, asking the number of claims for rebate of Income Tax that had been received from farmers in respect of farm losses² in each of the last five years. Sir John Simon: "I am not in a position to say how many claims in respect

¹ R. S. Edwards, "Farming and Income Tax," *ECONOMICA*, May, 1937. I am indebted to Mr. Edwards for some suggestions.

² "Rule 6 provides that if the result for the year is a loss he [the farmer] can set that loss against other income of that year." Edwards, *loc. cit.*, p. 210.

of farm losses have been received. The farmer may claim not only in respect of loss but also in respect of the profits of the year falling short of the amount of the Schedule B assessment, and the number of claims of both classes was 21,500 for the year 1932-33, 22,000 for the year 1933-34, 20,100 for the year 1934-35 and 18,200 for the year 1935-36. Figures for 1936-37 are not yet available."¹

The Royal Commission on the Income Tax, which made its report in 1920, Dr. Venn and Mr. Edwards have each discussed this choice of assessment that is given to the person engaged in farming in Great Britain and each in turn has condemned the system.

"We feel strongly," says the Royal Commission, "that an arbitrary basis tempered by concessions should not be tolerated any longer than is absolutely necessary. Many witnesses have supported this view and have given evidence in favour of transferring the profits of agriculture to Schedule D, so that the farmer may be treated for Income Tax purposes in the same way as any other producer or trader.

"We think that the justice of this course cannot be denied. . ."²

"The time is over-ripe for the abolition of a concession no longer necessitated," Dr. Venn states roundly.³

Mr. Edwards also disapproves of the present system and suggests that certain alterations should be made in it.⁴

Yet no analysis has been made so far of the economic effects produced by this concession to farmers and that is what we attempt in the following paragraphs.

2. In our analysis we will suppose to begin with that the income that any person derives from farming remains constant from year to year. The choice before the farmer will be represented as one of being assessed for purposes of Income Tax either on this amount of actual income or on the rental value of his farm. Then we will take into account that a farmer's income varies from year to year and that he may pay Income Tax on either the income of the year when the assessment is made or on that of the preceding year.

We will examine the respects in which a state of equilibrium

¹ *Parliamentary Debates, House of Commons Official Report*, 10th June, 1937, columns 1955-56.

² *Report of the Royal Commission on the Income Tax* (1920) p. 100.

³ J. A. Venn, *The Foundations of Agricultural Economics* (1933), p. 206.

⁴ *Loc. cit.*, pp. 214-15.

when these privileges are granted, differs from one in which no tax privileges exist. So we will be able to determine the economic effects of the privileges. In doing so we will take no account of the fact that the amount of tax revenue received by the Government would vary as between the condition of affairs when no privileges exist and that after the privileges have been granted: this factor of varying Government expenditure would be too difficult to take into account: its effect on the farming industry itself would be of the second order of small quantities.

First let us make the assumption that a farmer's income is steady as between one year and another. The Income Tax concession to farmers will then consist in their being taxed either on rental value or on their steady annual income.

The owners of land who let it out to tenant farmers will receive no *direct* benefit: because these owners are assessed for purposes of Income Tax on the amount of whatever income is transmitted to them by the tenants.¹ The people who benefit directly (through tax assessment on a lower size of income) are those who engage in the farming of land, whether they own the land that they farm or have hired this land from others.

3. To see the effect of the privilege on those who carry on farming, let us represent in diagram I the cost conditions to a farmer who grows only one crop. In the diagram the horizontal line of price through P is taken to be fixed, corresponding fairly well to the case where the farmer concerned produces a crop like wheat, say, for which there is a world market. The curve MVC_1 ($ABHP$) shows the farmer's marginal variable cost of production for different outputs of the crop, where variable costs are taken to include all expenses of production, excluding the rent he pays for the fixed quantity of land that he occupies, excluding of course any cost for the fixed capital he employs in the farm, and excluding the cost of the farmer's own labour, which we will also treat as a fixed factor.

Technical coefficients of production we suppose, to begin with, are fixed at each scale of output and independent of the height of the tax.²

If there be no tax the amount of produce placed on the

¹ Or rather landowners are assessed to Income Tax on a quinquennial valuation of land, which is based on the income transmitted to them by the tenants.

² The supposition is made in order to enable us to draw the diagram.

market annually by this farmer will be OM , given by the point of intersection of the curve of marginal costs with the horizontal line of price. The total annual return to

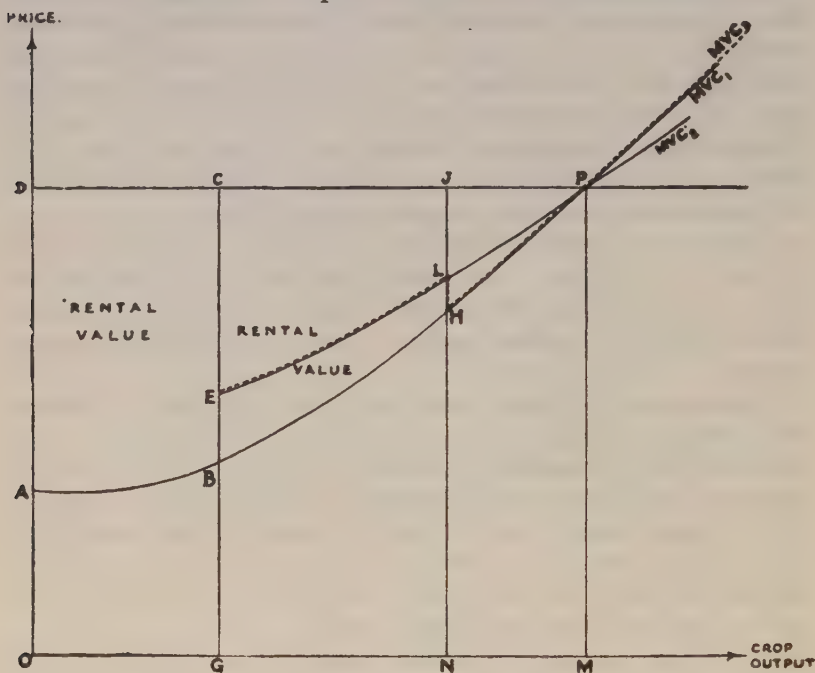


DIAGRAM I.

Area $ABCD$ = area $BHJC$.

= value of annual rental.

MVC_2 is shown as a dotted line.

Area $CBHP$ = return to farmer's capital and labour if there is no income tax.

Area $CELP$ = his return if income tax is paid on assessment equal to income earned.

Area $CELHP$ = his return if income tax is paid on assessment equal to rental value.

the farmer's capital, land and labour will be equal to the area $ABPD$. Out of this, however, a rent payment equal to area $ABCD$ falls to be made, leaving a net remuneration to the fixed factors, capital and labour supplied by the farmer, equal to area $CBHP$.

Now let us suppose that this farmer is required to pay Income Tax on an amount of income assessed as being equal to his total earnings. And let us suppose that the prices he pays to the factors of production remain constant and independent of the Income Tax, so that MVC_1 continues to be the curve of costs other than Income Tax. His Income Tax payment is now an expense necessary to production,

just like any of his other variable expenses; and the curve of marginal variable costs including tax to the farmer is MVC_2 , *ABELP* in the diagram. Before he will be required to pay Income Tax his gross income will have to exceed an amount equal to his rent payment. In the diagram *OG* is the quantity of crop that the farmer must sell at the existing price level, before his gross income becomes equal to his rent payment. Since the Income Tax absorbs a portion of each increment of income once the output *OG* has been passed, the shape of the new curve of cost, including tax, will be as shown. The *OMth* unit yields no return above variable costs of production: it therefore pays no Income Tax and the curve MVC_2 will pass through the point *P*. After the tax output will be *OM* units, as it had been before it.

Next, if the farmer may choose to pay Income Tax either on the amount of income that he earns, this being supposed meantime to be the same in each year, or else on an amount of income equal to the annual value of his rental, then following the law of minimum cost he will choose to pay Income Tax to begin with on the amount of income that he actually earns, and will do so until the amount of his earned income additional to his rent payment becomes equal to the value of his annual rental. After this point has been reached, when his earnings are greater than his rental value, he will choose to pay Income Tax on an assessment equal only to the value of his rental.¹ Thus he will always pay tax on whichever of the two assessments is the lower.

In the diagram the rental value of the farmer's land is taken to be equal to area *CBHJ*. Until the crop production corresponding to an income of this amount is reached, viz., a crop production *ON*, the farmer chooses to be assessed on his actual income; over the range *O* to *N*, therefore, the curve of marginal costs including tax to the farmer, MVC_3 (when he pays Income Tax but is permitted to do so on the alternative basis), is still *ABEL*, coinciding over this range with the curve MVC_2 . After output passes an amount *ON*, the farmer will choose to pay Income Tax on an assessment equal to the value of his annual rental. On units of output between *N* and *M*, therefore, he will

¹ This supposes the farmer's rental to be lower than his income, which, of course, is not necessarily the case.

pay no additional Income Tax, and his curve of marginal costs including tax will coincide, over this range, with the curve MVC_1 (HP). At the point L there will be a discontinuity in the curve of marginal costs including tax, MVC_3 . MVC_3 is shown in the diagram as a dotted curve. Output, as in each of the two previous cases, will be OM , given by the point of intersection of the curve of marginal costs with the price line.

The net return to the labour and capital of the farmer after payment of rent and of Income Tax, if he is assessed on his actual income, will be equal to area $CELP$. When he is offered the alternative basis of assessment his net return becomes equal to area $CELHP$; that is, equal to his previous net return plus an additional return LHP . The farmer's capital and labour, therefore, is more highly remunerated in this line of production as a result of the alternative basis of assessment than it would have been otherwise.

4. Now let us remove the assumption that the annual income of a farmer is constant from year to year. Let us suppose his income varies and that he may choose to be assessed on whichever is the lowest, his income of the year when the assessment is made, his income of the preceding year or on an income equal to the rental value of his farm. He will choose the lowest of these three. From this cause the net return to the labour and capital the farmer provides will be further increased.

5. If, however, we assume that labour and capital are in perfectly elastic supply to the industry, this increased remuneration to the labour and capital in it will not represent a possible equilibrium state of affairs. Instead, on these assumptions, the only factor that would be able to alter in price would be land; and the price of land would be bid up so that each farmer got just the normal rate of remuneration on the capital and labour involved. When rent had reached its new equilibrium level, the farmer himself would be indifferent whether he paid Income Tax to the government on the present or on an unprivileged basis. Not so the landowner. If these assumptions were realised the effect of the subsidy would be that land would have a higher rental value and would change hands at higher prices.

Since in these circumstances rents of land would have

risen, therefore land that was formerly below the margin of cultivation would now come into production: the area of land cultivated would have increased.

In fact, the long period curve of supply of labour to British agriculture will not be perfectly elastic; it will be upward sloping. After the tax privilege is granted more land will come into cultivation, and more labour will be employed at a higher wage rate. Since the prices of land and labour have both risen there may be some substitution of the one for the other in the productive process; while capital, since its price has remained constant, will tend to be substituted for each of the other two factors.

Again, clearly, the demand curves for most products of British farming are down-sloping. (Wheat is the case that approaches most closely to an exception to this rule.) As a result of the triple basis of assessment for farming profits, the quantities of these products produced will be greater and therefore their prices lower. The rise in the rents of farm lands, owing to this fall in the prices of the commodities that they produce, will be less great than if, as we had supposed initially, the prices of these products had been perfectly rigid. The area of sub-marginal land actually coming into production will be lowered through the fall that takes place in the price of farm produce; and the eventual rise in the wage rates of farm labour will be less on this account.

Lastly, the amount of tax remission enjoyed by any farmer as a result of the triple basis of assessment will be greater, the greater the rate at which he is liable to payment of Income Tax; that is, the tax remission is greater the richer he is. If the farmer's income is sufficiently low for him to pay no Income Tax then he gains no direct benefit from the provision. It will be rich people who will benefit most, and these rich people will tend to be induced to enter the farming industry in greater numbers than they otherwise would have done.¹

A person tends to invest capital in each line of production until he receives from it the same *net* return in each line. The tax remission that he gets on income accruing from agriculture will induce a rich person to invest money in agriculture beyond the margin at which it fetches the normal

¹ Rich people consider not only the monetary profits of agriculture in deciding whether to purchase farms or not, but also things like health and shooting. The attractions of farming in these regards remain the same after the tax privilege as they had been before it, and the additional attraction of a larger monetary return is added.

gross rate of return, and up to a further margin at which the gross rate of return is less than normal.

To take a purely illustrative example we may suppose that a person is investing money in farming and in any outside industry. On the last £ of income that he invests in outside industry he expects to get the normal gross rate of return on capital which is, say, 5 per cent. But from farming he may be content with a gross return of 4.5 per cent., so long as, at the margin, the lower gross rate in the case of farming is just counterbalanced by the lower rate of Income Tax payable on money accruing to him from this source, in such a fashion as to make the marginal net return from the farming investment equal to the marginal net return from outside investment, each of them amounting to, say, 3.5 per cent.¹

In the equilibrium state of affairs in fact, as this example illustrates, the marginal productivity of a £ of capital in farming will be different from what it is in other lines of production. But if a state of maximum productivity is to be realised in the community, the productivity of a £ at the margin must be the same in whatever investment it be placed.² Hence the existing privilege to British farming in the payment of Income Tax tends to prevent a state of maximum productivity from being realised in the community.

The richer farmers will have bid up the price of land and of labour : herein the small entrepreneur-farmer suffers. As well, these small farmers sell their output in competition with that raised by the richer farmers who, as a result of the privileged basis in tax assessment, have increased their output. This again will react to the disadvantage of the small farmers. The more rigid is the demand for the crops raised by the particular small farmer concerned, and the greater the increase in output of these crops by his rich competitors, the more disadvantageous to him will the triple basis of assessment turn out to have been. Hence on balance the position of the smaller farmers, who receive little or no direct benefit by way of tax alleviation from the triple basis and who suffer from it in these ways, will have been worsened through the Income Tax concession granted to British farmers.

¹ As is well known, wealthy farmers have in the past been to a large extent responsible for improvements made in agricultural technique. This feature may still be true to some extent at the present day. If so, agricultural invention will be another result likely to ensue from the tax privilege to farming.

² Cf. R. F. Fowler, *The Depreciation of Capital*, Chapter VI,

Consider the case of those small farmers who own the land that they till. Their capital good, land, will have increased both as to rental value and as to price. Through the increased output of produce by the richer farmers, these small owner-farmers may find the income that they derive from the husbandry of their lands reduced. As well, the wages paid to the farming labour they employ will have increased. A not unlikely outcome will be for a number of the small owner-farmers to find it more profitable to sell or let their land and hire out their labour services to other farmers.

6. Thus the effects of the existence of the concessions in Income Tax payment to British farming can be summarised as follows :—

Rich farmers get an increased net return on their capital. This acts as a subsidy. There is a consequent tendency for richer persons liable to Income Tax at the higher rates to be induced to enter the farming industry.

It leads to capital being invested in the farming industry beyond the margin at which it obtains the competitive rate of return. This tends to frustrate the realisation of a state of maximum productivity in the community.

There is an increased production of farm products.

A higher price is paid for land.

A higher wage rate is paid to agricultural labour.

There is a worsening of the position of poorer farmers through the increased competition that they meet in renting their land, in hiring their labour and in selling their crops. Those farmers suffer most for whose crops demand is most rigid and for whose commodities the increase in supply by the rich farmers has been greatest.

There is a tendency to a fall in the number of small owner-farmers.

SECTION II

COMPARISON OF A SUBSIDY THROUGH INCOME TAX WITH A DIRECT SUBSIDY.

7. We have already seen that the Royal Commission of 1920, Dr. Venn and Mr. Edwards, disapprove of the continuance of the present subsidy granted to British farming by means of the Income Tax. In discussing the desirability of the retention or abolition of the subsidy the question arises of the ends to which policy should be directed.

(i) If the end adopted in policy be that of equal treatment of all sections of the community, then it follows that the subsidy should be done away with and the profits of British farmers taxed under Schedule D of the Income Tax as are those of other classes in the community. It is on this ground that the Royal Commission and Dr. Venn suggest the abolition of the Schedule B assessment.

(ii) If the end which a person desires to attain is that of maximum productivity in the community, then the analysis we have given shows that the Schedule B assessment is an obstacle to this. Again it would follow that it should be removed.¹

It is not necessarily the case, however, that a person need subscribe to either or both of these criteria as the only valid ends of policy. A person may wish to increase the productivity of British agriculture even though this should be at the expense of some reduction in productivity of the country's industrial system, and at the expense of some inequality of treatment of the different occupational groups. The main reason—and it is quite an important one—favouring an eclectic attitude at the present time would be the possibility of the occurrence of war.² The tax subsidy we have described tends to increase the quantity of the country's food supply grown at home and so would strengthen our position in the event of occurrence of hostilities.

The further question arises: if it be decided to attempt to increase the community's food resources in this way is the making of this subsidy out of the Income Tax the best means by which to effect it? Or would not some other means, e.g., a direct subsidy or a tariff on agricultural commodities, be a better means towards attaining this given end?

In attempting a thorough-going answer to this question considerations of the precise numerical quantities involved as to outputs of commodities, their prices, etc., would require to be given: and at the present stage a treatment along these lines does not seem to be possible. We will therefore content ourselves by showing some of the main respects in which this type of subsidy out of Income Tax differs from other types of subsidy. The main points can

¹ Both these disadvantages, it should be noted, attach to any form of subsidy, e.g., a tariff, and are not special to a subsidy through Income Tax.

² Cf. Professor Robbins's discussion of a tariff for British Agriculture. *Tariffs, the Case Examined*, by Sir William Beveridge and others, p. 162.

be brought out by comparing this means of subsidy with the simplest of the other types, viz., a direct subsidy on output. In order to make the comparison definite let us suppose that a British Government has decided to subsidise farming to the extent of £1 million, say; and has decided to do it *either* by affording a privileged basis of assessment to farming in payment of Income Tax, of roughly the pattern we have described, *or else* by paying a certain sum of money per bushel of wheat that is grown. We point out first the advantages and then the disadvantages of the method of subsidy by Income Tax as compared with the method of direct subsidy.

(a) If a simple type of wheat subsidy after this fashion were to be introduced this would be equivalent to a rise in the price that the farmer receives for his wheat, or to a lowering in its cost of production. He would therefore extend the wheat production. The margin of production of one of the joint commodities of which he is a producer would be extended outwards: the production of each of the other constituents in the group of commodities which are in joint supply by him would, apart from induced reactions, be left unaffected.

To extend directly a single margin in this way, however, leaving other margins unaffected, is a relatively uneconomical method of promoting agriculture. More economical in its effects would be a means of subsidy by which the margin of production of each constituent in the group of commodities was extended a little further, so that the last penny spent in subsidy would be creating an equal additional value whether of wheat, beef, turnips, mutton, or any other of the joint commodities which the farmer supplies. This is the peculiar advantage of the method of subsidy by remission of Income Tax: it *operates on a wide front*, leading to an extension of the margin of production in not one but in all products. Money that the Government devotes to the extension of agriculture by way of remission of Income Tax will, therefore, be likely to go further in the creation of an additional value of farm produce than would a direct subsidy paid on wheat production.

If the object of the Government should be not to foster farming generally, but to foster the production of one or a few specific crops (as may be roughly true at the present day as regards wheat, milk and sugar beet), then the above

of banking, insurance and industry, the Stock Exchange and issuing houses.¹ Thus both borrowers and lenders in Great Britain are assured a sympathetic hearing and the Chancellor of the Exchequer has the advantage of expert advice which all parties to the business of the issue market have had a share in formulating and for which these parties must, therefore, stand responsible.² In announcing the establishment of this Committee, Mr. Chamberlain declared: "I think the time has come when there should be an advisory committee to advise me from time to time both generally upon the scope of the restriction [on foreign loans] and also upon particular applications."³

The establishment of this Advisory Committee has again brought to the foreground discussions of the policy which Great Britain has been following since 1931 with regard to foreign lending and also speculations as to what her future policy in this respect is likely to be.⁴

The present regulation of new issues had its origin in the crisis of 1931 and in the necessities of the great War Loan conversion scheme of the following year. For a time after the 1931 crisis there was almost complete prohibition on public loans to overseas borrowers.⁵ In June, 1932, in connection with the conversion of the Five Per Cent. War Loan, regulation was imposed on the entire new issue market. All borrowers were asked by the Chancellor of the Exchequer to refrain from making new issues until this conversion operation had been completed.

After January, 1933, however, the embargo was relaxed in favour of all members of the British Commonwealth. Hence the only restriction now in force on Commonwealth issues applies to the optional replacement of existing securities by new ones, "if these securities rank as trustee securities and involve either underwriting or an invitation

¹ The inclusion of the Deputy-Chairman of Vickers on the Committee has drawn fire—though quite ineffective—from His Majesty's loyal opposition in the House of Commons.

² See Midland Bank, *op. cit.*, April-May, 1936, p. 8.

³ House of Commons, *op. cit.*, p. 2601. Mr. Chamberlain's announcement, which was made in response to a question in Parliament, contained "a fuller and more closely reasoned statement than any issued hitherto of the principles actuating official regulation of the new capital market. The wording of this statement must henceforth and until subsequent amendment be referred to as the text of the Government's wishes in the matter of new issues, and must be regarded as having in practice the force of law." Midland Bank, *op. cit.*, April-May, 1936, p. 8.

⁴ For a general discussion of the recent regulation of foreign loans by Great Britain see J. Henry Richardson, *British Economic Foreign Policy*, New York, 1936, chapter III, especially pp. 69-75.

⁵ *The Economist*, November 3rd, 1934, p. 831.

to the public to subscribe new cash."¹ In such cases intended borrowers are asked to approach the Treasury before setting the transaction in hand and also to secure agreement with the Bank of England whose chief concern is to arrange the dates and amounts of issues. By this method London is able to co-ordinate the requirements of Imperial borrowers and so prevent congestion in the new issue market.

The special position of trustee securities, which has changed somewhat in the last few years, is particularly interesting in the light of recent landmarks of constitutional development in the British Commonwealth of Nations, and needs a word of further explanation. After the historic Balfour Declaration of 1926 and the Statute of Westminster of 1931, the Dominions remained in one respect only still subject to Imperial legislative authority: the Imperial Parliament retained the right of disallowance in connection with trustee securities. The Colonial Stock Act of 1900 empowered His Majesty's Treasury in the United Kingdom to make regulations governing the admission of Dominion stocks to the list of trustee securities in the United Kingdom. One of the conditions prescribed by the Treasury, which the Dominion had to meet in order to obtain admission of its stocks to the rank of trustee securities with the enormous advantages resulting from this status, was the requirement that the borrowing Dominion Government place on record a formal expression of its opinion that any Dominion legislation which *appears to the Government of the United Kingdom* to alter any provision affecting the stock to the injury of the stockholder or to involve a departure from the original contract might properly be disallowed.² This exceptional power of disallowance—it was agreed in the deliberations of the Conference on the Operation of Dominion Legislation which preceded the Statute of Westminster—must remain where stock of trustee status was outstanding.³ By 1934 all the Dominion Governments concerned except

¹ Instructions of the Chancellor of the Exchequer to the Advisory Committee, House of Commons, *op. cit.*, p. 2603.

² See A. B. Keith, *Speeches and Documents on the British Dominions*, 1918-1931, pp. xxxii, 176, 177. The Government of the Dominion of Canada in announcing in May, 1934, the opening of its issue of £10,000,000 of 3½ per cent. Registered Stock, 1950-1955, stated in its published announcement: "The Government of the Dominion of Canada will comply with the requirements of the Colonial Stock Act, 1900, in order that Trustees may invest in this Stock, subject to the provisions set forth in the Trustee Act, 1925." See *The Times*, London, May 25th, 1934.

³ See Cecil T. Carr, "Review of Legislation (British Empire), 1934," *Journal of Comparative Legislation*, May, 1936, p. 2.

the Union of South Africa had reasserted the right of the Imperial Government to disallow legislation impairing the rights of holders of Dominion stocks admitted to trustee status in the United Kingdom.¹

In 1934 a new Colonial Stock Act—understood to have special reference to South Africa but framed in general form applicable to any Dominion—declared that the old Treasury conditions would be regarded as having been observed if either (1) the old requirement is complied with, or (2) the Dominion Government passes an act confirming an undertaking that it will not legislate to the detriment of the stockholder without first securing the agreement of the United Kingdom. If attention is called to any such prejudicial legislation, the Dominions agree to make such amendments as may be requested by the Government of the United Kingdom.²

Thus under the new Colonial Stock Act of 1934, the United Kingdom arranges for a modification of the former Treasury conditions regarding colonial stocks enjoying trustee status, provided a suitable undertaking is given by His Majesty's Government in a Dominion by which the interests of stockholders are safeguarded. In pursuance of this Act, and with the desire of abolishing the right of disallowance by repealing the South Africa Act of 1909, the Union Government gave acceptable guarantees to the United Kingdom. These undertakings were then embodied in Act 49 of the Parliament of the Union in 1934 which declares:

"The Union Government undertake that legislation which appears to the United Kingdom Government either to amend Act No. 6 of 1913 of the Union to the injury of stockholders or to involve a departure from the original contract in regard to the stock shall not be submitted for Royal Assent except after agreement with the United Kingdom Government. Furthermore, if attention is drawn to such legislation already passed by the Union Parliament the Union Government will take the necessary steps to ensure such amendments as may be requested by the United Kingdom Government."³

¹ A. B. Keith, *Letters on Imperial Relations, Indian Reform, Constitutional and International Law*, London, 1935, pp. ix-x. For a Treasury list of Colonial Stocks in respect of which the provisions of the Colonial Stocks Act, 1900, are for the time being complied with see *Accounts and Papers*, 1934-35 (117) XII, 143.

² Cecil T. Carr, loc. cit.

³ W. G. Hoal, "Review of Legislation (Union of South Africa), 1934," *Journal of Comparative Legislation*, May, 1936, pp. 125-6.

In accepting this undertaking by the Union Government, the United Kingdom relinquished its right of disallowance. In other words, there is now substituted for the *positive right* of disallowance by the Imperial Government merely a *positive duty* by the Dominion Government to execute faithfully its undertakings with regard to loans floated in the United Kingdom and admitted to trustee rank. Despite the misgivings of certain writers¹ as to the effectiveness—from the viewpoint of the British investor—of these new-provisions under the Colonial Stock Act of 1934, our purpose here is merely to observe that these are conditions on which certain Dominion issues are now to be admitted to the London market.

With this unimportant exception regarding trustee securities only foreign issues have remained under control since January, 1933. At this time Imperial borrowers were again given practically free access to the London market, while foreign borrowers could enter it only by express permission of the Treasury.² For the purpose of regulation "foreign issues" are defined as "issues on behalf of borrowers domiciled outside the Empire or issues the proceeds of which would be remitted directly or indirectly to countries outside the Empire."³ Mr. Neville Chamberlain, the Chancellor of the Exchequer, now points out, however, that the expression also includes "the acquisition from foreign holders of large blocks of securities dealt with on the London Stock Exchange, with a view to their sale in this country either by an issue to the public or otherwise."⁴ Unless the Chancellor of the Exchequer's permission has been previously obtained, no such issues or acquisitions may be made.

The function of the new Advisory Committee is to advise

¹ Keith concludes: "So artificial a situation, and one so incompatible with Dominion status, cannot well endure, and investors will sooner or later in their own interests have to seek more practicable safeguards or to recognise that none are possible . . . It is obvious that a Union Parliament would be most unwilling to alter an Act originally passed at the invitation of a Union Government, because of any British request." It is Keith's opinion, therefore, that the 1934 arrangement replaces disallowance by a procedure which, if brought into action, would probably involve a bitter inter-Imperial conflict, so that the British Government—being unwilling to raise an issue of first-class importance—would doubtless decline to take action, preferring instead to acquiesce in injustice to investors. A. B. Keith, *Letters on Imperial Relations*, pp. ix-x, 170-172.

² Midland Bank, *Monthly Review*, October-November, 1933, p. 5.

³ *Ibid.*, December, 1933-January, 1934, p. 6; House of Commons, *op. cit.*, p. 2603. In announcing the opening in London of its £10,000,000 issue of May, 1934, the Canadian Government stated in the announcement: "No part of the proceeds will be remitted directly or indirectly to countries outside the British Empire." *The Times*, London, May 25th, 1934.

⁴ House of Commons, *op. cit.*

the Chancellor of the Exchequer not only upon the scope of the restrictions to be imposed, but also upon particular applications for lifting the embargo. The applications considered by the Committee include (a) financing on behalf of foreign governments, states, or other public authorities, (b) offers of share or loan capital to the public which involve the remittance of funds directly or indirectly to any country outside the Empire, (c) offers involving such remittances made otherwise than to the public in respect of which permission to deal may be sought from the Stock Exchange, and (d) the acquisition of foreign holdings in large blocks with a view to their sale in Great Britain.

Britain's embargo on foreign lending, it may be observed, has never had any legislative force.¹ There has never been any machinery to ensure compliance, and the new Advisory Committee is in no sense a coercive organ. Nevertheless, the embargo since its inception in 1931 has worked smoothly; the restrictions have been voluntarily accepted at the Chancellor's request by the City of London. Even if the City were not inclined to offer its voluntary and loyal compliance with the Government's request, this extra-legal influence of merely advising bankers against making certain foreign loans would still prove practically as effective as a legal ban. That the recommendation of a government against a foreign loan is as certain to put a stop to its flotation as would a legal disqualification, has been proved in the experience of many countries other than Great Britain.² Few bankers, indeed, in Great Britain or elsewhere, care to purchase bonds of a foreign country and attempt to sell them to domestic investors in the face of disapproval by their government. The risk of being left with large sums of unsold securities on their hands is simply too great. A Government is, therefore, quite as able to place an effective embargo on foreign lending by extra-legal influences as by formal legal action.

¹ *The Economist* (April 11th, 1936, pp. 86-7) has voiced strong protests against the "species of financial dictatorship" to which the new capital issue market has been, and is to-day, subjected by the Treasury without "a shred of Parliamentary authority." It sees in the creation of the new Advisory Committee "an indefinite perpetuation" of what has hitherto been, in theory at least, a purely temporary expedient. *The Economist* declares it highly desirable, therefore, that the Government secure Parliamentary sanction for the "far-reaching departure from tradition and practice, in a market which has attained paramount international status under a régime of freedom."

² The power of a government in discouraging foreign loans is well illustrated, for example, in the collapse, immediately after President Wilson's disapproving statement, of American participation in the six-power consortium arranging a loan to the Chinese Government in 1913.

The primary object of Great Britain's restriction on foreign lending, it is declared, is to protect sterling exchange against sudden and dislocating strains. In the achievement of this primary purpose, however, certain secondary objectives are kept constantly in mind by the British Government and deserve our special consideration. The Advisory Committee in performing its task of considering applications has been instructed to take into consideration in the first place "the general economic situation of the country." The country here referred to is Great Britain, because it is clearly understood that the grant of permission for the issue of a loan does not in any sense imply an opinion on the part of the Government as to the soundness of the investment from the point of view of the investor. The question of soundness is left entirely for the market to judge.

In considering what foreign long-term financing the "general economic situation of the country" will permit London to undertake, the Committee is guided not only by the state of the exchanges and the various kinds of pressure to which sterling is exposed, but also by the volume of capital likely to be available for this purpose. It is declared to be of great importance that "the capital required for development in the United Kingdom should not be restricted by excessive lending abroad."¹

The Committee is instructed to bear in mind also the recommendations of the Committee on Finance and Industry that in foreign investment "it is primarily towards British-owned enterprise abroad that we should wish to see our energies and capital turned rather than merely towards subscribing to foreign Government and municipal loans, which absorb our available foreign balances while doing little for our industry and commerce."²

Account is likewise taken of the treatment accorded to British-owned enterprise by the country which seeks permission to borrow in London. Furthermore, in considering recommendations made by the Advisory Committee the Chancellor of the Exchequer has declared that "where

¹ In connection with the needs for domestic development, we should note the creation of the Special Areas Reconstruction Association, Ltd., formed with private capital but with Government aid, which is to afford financial assistance to firms in the special areas "who satisfy the company that whilst having reasonable expectations of ultimate success on an economic basis they are not for the time being in a position to obtain financial facilities from banks or (existing) financial institutions." See Midland Bank, *op. cit.*, April-May, 1936, p. 8.

² Instructions of the Chancellor of the Exchequer, House of Commons, *op. cit.*

necessary" he will take into account "*any financial or other questions which may be at issue between this country and the country of the borrower.*"¹ That political considerations are to be taken into account in lifting or maintaining the ban on foreign lending is thus made very clear and specific. The international financier and the diplomat of lending countries have often been joined together, and Mr. Chamberlain is here announcing frankly that they will not be divorced by the present policy of Great Britain.

Creditor nations have often been able to use the privilege of admission to their money markets as a valuable *quid pro quo* in the diplomatic game. With London's relative scarcity of available capital and with the strong position of New York as an alternative market—notwithstanding the Johnson law forbidding loans to defaulting countries and the scrutiny of the Securities Exchange Commission—Britain's ability to play the diplomatic game on the basis of foreign loans is of course considerably lessened. It is, however, by no means negligible. Indeed, the Minister of Foreign Affairs may be able, if he is so disposed, to use to good advantage the co-operation of the Chancellor of the Exchequer in his control over foreign loans.

In summary, then, the decision of the Advisory Committee and the Chancellor of the Exchequer in any particular case with regard to lifting the foreign loans embargo is determined by the following factors: the "general economic situation" of the United Kingdom, the state of the exchanges, the volume of capital available above domestic requirements, the desire to aid British-owned enterprise abroad, the treatment of British-owned enterprise by the foreign country concerned, and finally *any financial or other questions* at issue between Great Britain and the borrowing country.

Aside from the above considerations, the policy which has been adopted by the Chancellor of the Exchequer and which is being continued under the Advisory Committee² is to maintain very strictly the embargo on all foreign loans, with two important exceptions. In the first place there is a relaxation of the restriction in favour of sterling issues

¹ Italics are the writer's.

² While those desiring to issue foreign loans are instructed to apply directly to the Committee, the Chancellor of the Exchequer is ultimately responsible. When the matter was under discussion in the House of Commons, Mr. Churchill asked for assurance that the Chancellor of the Exchequer would "retain the ultimate control of the operations of this committee and that, consequently, during present conditions his responsibility to the House will be unimpaired." Mr. Chamberlain gave his "most unqualified assurance in that respect. It will be only an advisory committee."

whose proceeds are "calculated mainly to produce direct benefit to British industry" by the purchase of British goods. In a debate in Parliament on the East Indian Loan Bill in 1923, an amendment was proposed requiring at least 75 per cent. of any loan raised to be spent in Great Britain. The Government replied that without such a provision 95 per cent. of Indian loans raised in London for the year ending March 1st, 1923, was spent directly in Great Britain.¹ Unfortunately from the British point of view this happy situation does not always exist, particularly with respect to "foreign" loans. Hence the necessity of the special provision—which has been put in force since 1931—that in order to warrant lifting the general embargo, a foreign issue must be used for the purpose of financing additional exports from the United Kingdom.

The second, and more important, exception to the general embargo is made in the case of issues by a country within the Sterling Area where the loan is required to increase the sterling assets of that country and so to minimise the fluctuations in the exchange. This exception forms one of the principal features of Britain's foreign loan policy at the present time. The so-called "Sterling Area" is made up of that group of countries both within and outside the British Empire whose currencies are closely linked to the British pound and whose monetary policies are governed more or less directly by those followed from time to time by the Chancellor of the Exchequer and the Bank of England. The principal members of this group, in addition to the Dominions and Colonies, are Egypt, Argentine, Norway, Sweden, and Denmark, though certain other countries are included.

One of the chief aims of Britain's monetary policy since her departure from gold on September 21st, 1931, has been to induce an increasingly large number of countries to join the Sterling Area by linking their currencies to the British pound, and thus gradually widen the area of stability in terms of sterling rather than in terms of gold. There is, then, a close co-ordination of her foreign lending policy with her monetary policy by giving "favourable consideration" to issues of countries in the Sterling Area. Such issues may be of vital importance in maintaining stability

¹ Benjamin H. Williams, *Economic Foreign Policy of the United States*, McGraw-Hill Book Company, New York, 1929, p. 21; House of Commons, *Parliamentary Debates*, Vol. 166, p. 2080.

of exchange in relation to sterling. This policy of Great Britain has been stated upon several occasions and is now repeated by Mr. Chamberlain in his recent answer to Parliament.

The consistency with which the Chancellor of the Exchequer has followed this avowed policy is well illustrated by analysing the new capital issues which have actually been floated in the London market since the beginning of 1931. Of the total new issues floated in London in 1931, 48 per cent. were on behalf of the United Kingdom; nearly 42 per cent. were for British overseas borrowers; and more than 10 per cent. were "foreign" issues. During the last five years British overseas issues and foreign issues have shown such relative decline that for the first half of 1936 United Kingdom issues constituted 91.5 per cent. of the total, British overseas issues 7.8 per cent., and foreign issues only 0.7 per cent. of the total. During the four years 1932-1935 approximately £580 millions of new capital issues were floated in the London market. Of this amount, £117 millions were on behalf of British overseas borrowers and only slightly more than £14 millions were foreign issues.¹ These figures show very clearly indeed that an increasing proportion of new capital issues floated in the London market are flotations for the United Kingdom itself or for the Dominions or Colonies. The "foreign issues" have been almost entirely for the two purposes mentioned above: (1) to aid British industry by the purchase of British goods, or (2) to help countries of the Sterling Area increase their London balances. Lifting the embargo for the second purpose is well illustrated by the £1,150,000 loan of August, 1934, which was used to increase the London balances of the Bank of Norway. The £1,000,000 loan to the Danish Government in April, 1933, may be said to have achieved a two-fold object, both of increasing Denmark's balances in London and of aiding British industry by an order for British steel.

Closely allied with, and indeed a part of, Great Britain's foreign loan policy with respect to the first of the above purposes, namely, to aid British industry by the purchase of British goods, is the Government guarantee of credits granted for the sale of goods wholly or mainly manufactured in the United Kingdom. The powers vested by the Overseas Trade Acts in the Board of Trade to give guarantees in

¹ An analysis of new capital issues in the United Kingdom by destination may be found in Midland Bank, *op. cit.*, December, 1935-January, 1936, p. 6, and June-July, 1936, p. 7.

connection with such exports are administered by the Export Credits Guarantee Department in consultation with an Advisory Committee of experts in industry, banking and insurance. The Government, by the system of guarantee, enables British exporters to accept sound business opportunities which they might otherwise be compelled to refuse because of inadequate resources. The specific purpose of the Government, however, is to carry the degree of risk somewhat further than private enterprise feels able to do on its own responsibility. Thus far the Government has carried out this purpose with a net profit. By taking out a policy with the Export Credits Guarantee Department the exporter transfers the major part of his risk (usually 75 per cent., it being deemed essential that he carry some of the risk himself) and he may very easily assign his rights in the policy to his bank in negotiating an overdraft or other form of advance. The Department provides not only short-term credits for the export of consumable goods but also longer term credits for the export of capital goods. For example, the Department guaranteed the necessary credits for the supply of Westinghouse brakes to the Polish State Railways—a transaction involving approximately £5,000,000. A more recent example of the operations of the Department is the guarantee of a £10,000,000 credit for the Government of the U.S.S.R. in July, 1936. A formal agreement was entered into by the Department with the Soviet Trade Representative¹ under which the Department should endorse, and thereby guarantee, promissory notes signed by the Soviet Trade Representative on behalf of the Government of the U.S.S.R. up to a total of £10,000,000 in respect of orders placed by Soviet Import Organisations in the United Kingdom during the period August 1st, 1936, to September 30th, 1937. The promissory notes are expressed in pounds sterling, bearing interest at $5\frac{1}{2}$ per cent., and are payable five years from the date of issue. The Government of the U.S.S.R. was given complete freedom in the placing of orders and in the selection of manufacturing firms, provided, however, that the goods purchased should not be munitions of war and that at least 50 per cent. of the sale price of the goods should be derived from expenditure in respect of materials grown or produced or work done in the United Kingdom. In exceptional cases orders not

¹ Cmd. 5253 of 1936.

complying with this general definition but which nevertheless gave rise to "substantial employment" in the United Kingdom might also be covered by the agreement after consultation with the Department. The purpose of such credits, it is clear, is to facilitate increased purchases of goods wholly or mainly manufactured in the United Kingdom. Transactions of the above kind are equivalent practically to issuing a loan to the Government of Poland or the Government of the U.S.S.R. Transactions of this character are rendered the more necessary because of the embargo on foreign loans. The work of the Export Credits Guarantee Department, therefore, supplements the work of the Foreign Transactions Advisory Committee in its policy of lifting the embargo on foreign lending where the proceeds of such loans are used to aid British industry by the purchase of British goods.

From this survey of Great Britain's foreign loan policy since her departure from gold, and the birth of the Sterling Area in 1931, there emerge those features of that policy which stand out most clearly: new capital issues floated in London have been confined almost completely to issues on behalf of Imperial borrowers, and the very small percentages on behalf of foreign borrowers have been designed, in the main, either to increase London balances of countries in the Sterling Area or to provide direct aid to British industry.¹ Occasionally a single loan achieves the double purpose of increasing London balances of Sterling Area countries and at the same time providing aid for British industry. The loans which have been granted in the Sterling Area are not large loans for London. Yet they are of special significance because they represent a new policy of the British Government to lift its embargo on capital exports in cases where such loans will contribute to the stability of exchanges by fortifying the position of those countries within the Sterling Area. Great Britain thus renders substantial benefits to the Empire and to other Sterling Area countries by aiding them, in times of stress, to keep their currencies linked to the British pound.

In spite of the almost negligible new foreign issues on the London market in recent years, it would be a "notorious

¹ The Austrian loan of £4,514,200 in August, 1933, which constituted the greater part of Great Britain's foreign lending in that year, was granted under very special circumstances. Its proceeds, moreover, were used to reimburse the Bank of England for an advance to the Austrian Government in the spring of 1931 shortly after the Creditanstalt crisis.

fallacy" to assume that British investment in foreign countries is at a standstill, because the new issue market is not the only channel for investment abroad.¹ There is, first of all, complete freedom of transferring pounds sterling into foreign currencies and, secondly, there are ample facilities for the purchase in London of foreign securities.² The inconsistency of keeping these channels open while maintaining a strict embargo on new foreign issues has been severely criticised. The ostensible reason for the continuance of the embargo is the protection of sterling from the pressure of capital exports. As pointed out above, however, no restrictions are placed on British or foreign securities held or issued abroad, except for large amounts, for resale in the United Kingdom. Since these exert similar pressure on the exchanges, the official policy on this point "has not even the merit of consistency."³

In recent months, however, the Treasury has in some measure directed its action along the lines indicated by this criticism. Investment trust companies have received an intimation from the Foreign Loans Advisory Committee that they should restrict their investments in foreign securities. The Advisory Committee, it is now known, feels that the proportion of such new issues invested abroad should be confined to the minimum necessary for the conduct of the business in accordance with the ordinary practice of investment trusts. The Chancellor of the Exchequer has declared in Parliament that if in the case of the applicant company the proportion of foreign investment were unusually high, the general purpose of the Government would be furthered by a reduction of that proportion. This announcement has, in turn, given rise to further criticisms: (1) that to restrict or to limit the foreign earnings of investment trusts does not strengthen but merely weakens still further the position of the pound, particularly when investments in American securities have recently yielded a considerable profit in both capital and income, and (2) that it is mere

¹ On April 30th, 1936, Mr. R. C. Morrison asked the Chancellor of the Exchequer whether he would consider the advisability of extending the powers of the Foreign Loans Advisory Committee to cover short-term banking and commercial credits. The Chancellor of the Exchequer replied: "No, sir, I do not think this proposal is practicable. I should be sorry, moreover, to impose any restriction which would interfere with the normal and legitimate business of the London market and would only aggravate the difficulties with which British traders have to contend." House of Commons, *Parliamentary Debates*, Vol. 311, 1935-1936, p. 1083.

² The Midland Bank, *Monthly Review*, December, 1934-January, 1935, p. 6.

³ The Midland Bank, *Monthly Review*, October-November, 1933, p. 6.

folly to interfere with the judgment of experienced professional investors like the investment trust companies and insurance companies as to the securities of the countries in which they invest their money and that these investors may be safely relied upon to suspend their operations when they cease to be profitable.

The Economist offers criticism on a different basis. It suggests that "if the Treasury is to continue to perform the negative function of a national investment board, it would seem desirable that its judgments should be dictated more clearly by economic considerations."¹ The answer to this criticism is, of course, that policies of international trade and finance of the present day by no means follow strictly economic lines. Moreover, the purely economic advantage of keeping the currencies of countries in the Sterling Area in step with the British pound is by no means easily calculated.

Great Britain's foreign loan policy is, of course, only a part of her general financial and commercial policy. The encouragement of international trade by the conclusion of bilateral trade agreements has been a definite policy of the National Government since its inception in 1931 and since its institution of the tariff system of 1931 and 1932. More particularly, Great Britain has been attempting since 1931 to forge closer commercial and financial links with countries of the Empire and with that more inclusive group of countries now familiarly known as the Sterling Area. Preferential treatment in the matter of international loans to this group of countries has been only one of the important instruments used to achieve this desired end. Indeed the true significance of Britain's foreign loan policy can be gauged only by viewing it in its relation to such other of these instruments as the Ottawa Agreements, the reciprocal trade pacts with non-Empire countries, the development of central banking in the Dominions, and the linking of various currencies to the British pound.

There is a variety of opinion as to the significance of the recent establishment of the Advisory Committee on Foreign Loans. The Labourites have hailed it as a step toward their ideal of a national investment board. Many express the opinion that the operations of this new Committee will not make foreign lending any easier. Others regard it as a step toward eventual destruction of the embargo. *The*

¹ *The Economist*, November 11th, 1933, p. 917.

Times expresses the hope that the appointment of this "expert and representative" body will in fact prove to be "a first, if small, step towards the resumption of international financing, upon which, of course, the revival of international trade is in part dependent."¹

Mr. Chamberlain's announcement of policy on April 7th, 1936, does, in fact, justify some hope for a very slight relaxation of the embargo. He declares that with a view to "facilitating credit" the Committee should "at an early date consider whether it can give general sanction subject to specified conditions for issues for particular types involving remittances abroad which are both small in themselves and small in relation to the total issue." Moreover, the very establishment of the Advisory Committee might be interpreted as an augury of a change in Britain's foreign lending policy. Mr. Chamberlain asserts very clearly, however: "I have not at present in mind any radical alteration of the restriction."² This statement must, for the time being at least, and until further announcement, be accepted as the final word on British policy with regard to foreign loans.

What have been the general results of Great Britain's foreign loan policy during the years since the 1931 crisis? To what extent has the embargo actually prevented the flotation of foreign loans in London which would have been made in the absence of the embargo? How far has the embargo protected sterling from the pressure of capital exports? What advantages have accrued to the Dominions, to other Sterling Area countries, and to the United Kingdom itself? The answers to these questions are indeed difficult. Recent years have witnessed a great scarcity of good borrowers, and the long experience of London bankers has rendered them none too anxious to assume doubtful risks. Hence even without Treasury control foreign lending by London would have greatly declined during the last six

¹ *The Times*, London, April 9th, 1936, 19: 1.

² This declaration of April 7th, 1936, was reasserted a month later. See House of Commons, *Parliamentary Debates*, Vol. 310, 1935-1936, p. 1862. Again on February 25th, 1937, the Chancellor of the Exchequer was asked whether he was yet contemplating any modification of the present policy in regard to foreign issues. Mr. Chamberlain replied: "The Foreign Transactions Advisory Committee, under the chairmanship of Lord Kennet, have been advising me upon this subject for nearly a year. My honourable friend will be aware of their terms of reference. The work done by the committee has been most valuable, and I am under a great obligation to the members. Experience has confirmed my view that a measure of restriction in this matter continues to be necessary in the public interest, and I have in mind no change of policy. I would like to take this opportunity of expressing my appreciation of the manner in which those concerned in projected foreign issues and similar transactions affected by the policy have continued to conform with my wishes."

years. It cannot be doubted, however, that the Treasury control has been, and continues to be, an important factor in diminishing the amount of foreign issues floated in London. Such issues have now practically reached the vanishing point. With the return of world prosperity and with the consequent prospects for profitable foreign investment it is difficult to assume that Britain's foreign lending would be at its present low ebb in the absence of Treasury control. It follows, therefore, that the foreign loan policy has, in some degree at least, protected sterling from the pressure of capital exports. Admitting that the volume of capital exports in this form would have been relatively small in any event, we should remember that this margin may have a greater significance than is often realised. While prohibiting loans to foreign countries, or granting them only under very special circumstances, the British Government have by their policy encouraged Empire and other Sterling Area countries to borrow in London. With non-sterling countries thus excluded from London, the countries of the Empire and of the Sterling Area generally have probably been able to borrow on considerably better terms. Empire countries, moreover, continue to enjoy the further advantage of having their securities rank as trustee securities in the United Kingdom. The encouragement of Empire and other Sterling Area loans has promoted the building up of sterling balances by these countries in London. Foreign countries which have tied their currencies to sterling have been aided in maintaining that link by Britain's foreign loan policy. The area of stability in terms of sterling has been gradually widened and a fundamental aim of British monetary policy has thus been achieved. Furthermore, by prohibiting excessive foreign lending Great Britain has increased the supply of capital necessary for domestic requirements. The "depressed areas" have been assisted. Finally, a rearmament programme on an unprecedented peace-time scale has been initiated and is well on its way to completion. In view of the results achieved and considering the present state of world finance it seems unlikely that British Government control over foreign loans will be abandoned in the near future.¹

¹ On February 1, 1938, the Chancellor of the Exchequer announced that greater latitude would in future be allowed to foreign issues other than issues on behalf of foreign governments, local authorities or state-controlled organisations [*Editor*].

A Note on the Pure Theory of Consumer's Behaviour

By P. A. SAMUELSON

FROM its very beginning the theory of consumer's choice has marched steadily towards greater generality, sloughing off at successive stages unnecessarily restrictive conditions. From the time of Gossen to our own day we have seen the removal of (*a*) the assumption of linearity of marginal utility; (*b*) the assumption of independence of utilities; (*c*) the assumption of the measurability of utility in a cardinal sense; and (*d*) even the assumption of an integrable field of preference elements.

The discrediting of *utility* as a psychological concept robbed it of its only possible virtue as an *explanation* of human behaviour in other than a circular sense, revealing its emptiness as even a construction. As a result the most modern theory confines itself to an analysis of indifference elements, budgetary equilibrium being defined by equivalence of price ratios to respective indifference slopes.

Consistently applied, however, the modern criticism turns back on itself and cuts deeply. For just as we do not claim to know by introspection the behaviour of utility, many will argue we cannot know the behaviour of ratios of marginal utilities or of indifference directions.

Why should one believe in the *increasing rate of marginal substitution*, except in so far as it leads to the type of demand functions in the market which seem plausible? Even on the advanced front we are confronted with this dilemma—either the argument with respect to indifference varieties is circular or to many people inadmissible (at least without further demonstration).

Hence, despite the fact that the notion of utility has been repudiated or ignored by modern theory, it is clear that much of even the most modern analysis shows vestigial traces of the utility concept. Thus, to any person not

acquainted with the history of the subject, the exposition of the theory of consumer's behaviour in the formulation of Hicks and Allen¹ would seem indirect. The introduction and meaning of the marginal rate of substitution as an entity independent of any psychological, introspective implications would be, to say the least, ambiguous, and would seem an artificial convention in the explanation of price behaviour. (This would be particularly so in the many-commodity, non-integrable case.)

I propose, therefore, that we start anew in direct attack upon the problem, dropping off the last vestiges of the utility analysis. This does not preclude the introduction of utility by any who may care to do so, nor will it contradict the results attained by use of related constructs. It is merely that the analysis can be carried on more directly, and from a different set of postulates.

All that follows shall relate to an idealised individual—not necessarily, however, the rational *homo-economicus*. I assume in the beginning as known, i.e., empirically determinable under ideal conditions, the amounts of n economic goods which will be purchased per unit time by an individual faced with the prices of these goods and with a given total expenditure. It is assumed that prices are taken as given parameters not subject to influence by the individual.

Postulate I. Mathematically we assume as known the following single-valued functions :

$$\left. \begin{aligned} \psi_1 &= b^1(p_1, \dots, p_n, I) \\ &\vdots \\ \psi_n &= b^n(p_1, \dots, p_n, I) \end{aligned} \right\} \quad (1.0)$$

subject to

$$\psi_1 p_1 + \psi_2 p_2 + \dots + \psi_n p_n = \sum_{i=1}^n \psi_i p_i = I \quad (1.1)$$

Since we have $(n+1)$ equations and only n dependent variables, it is obvious that we may suppress one of the equations as redundant. We may rewrite our first assumption omitting the first equation in (1.0).

$$\left. \begin{aligned} \psi_i &= b^i(p_1, \dots, p_n, I) \quad (i=2, \dots, n) \\ \sum_{i=1}^n \psi_i p_i - I &= 0 \end{aligned} \right\} \quad (1.2)$$

¹ Hicks and Allen, "A Reconsideration of the Theory of Value," *Economica*, February and May, 1934.

Thus, confronted with a given set of prices and with a given income, our idealised individual will always choose the same set of goods. For mathematical convenience we assume that all our functions and their derivatives of the desired order are continuous with no singularities in the region under discussion.

Postulate II. We further assume that the consumer's behaviour is independent of the units in which prices are expressed. More specifically, if we multiply all prices and income by the same positive quantity, the amounts taken will remain the same.¹

Mathematically our functions in set (1.2) are all homogeneous of order zero; or

$$\left. \begin{aligned} \psi_i &= b^i(\lambda p_1, \dots, \lambda p_n, \lambda I) \quad (i=2, \dots, n) \\ \sum_{i=1}^n \psi_i \lambda p_i - \lambda I &= 0 \end{aligned} \right\} \quad (1.21)$$

Defining $\lambda = \frac{I}{p_1}$, these may be rewritten

$$\left. \begin{aligned} \psi_i &= b^i \left(1, \frac{p_2}{p_1}, \dots, \frac{p_n}{p_1}, \frac{I}{p_1} \right) \quad (i=2, \dots, n) \\ &= g^i \left(\frac{p_2}{p_1}, \dots, \frac{p_n}{p_1}, \frac{I}{p_1} \right) \quad (i=2, \dots, n) \\ \psi_1 + \sum_{i=2}^n \frac{p_i}{p_1} \psi_i - \frac{I}{p_1} &= 0 \end{aligned} \right\} \quad (1.3)$$

This is equivalent to using p_1 as our *numéraire*, i.e., setting its price equal to unity.

Let us define $\beta_i = \frac{p_i}{p_1}$, $(i=2, \dots, n)$ and $I^0 = \frac{I}{p_1}$

We may rewrite (1.3) in the form

$$\left. \begin{aligned} \psi_i &= g^i(\beta_2, \dots, \beta_n, I^0) \quad (i=2, \dots, n) \\ \psi_1 + \sum_{i=2}^n \beta_i \psi_i - I^0 &= 0 \end{aligned} \right\} \quad (2.0)$$

Thus far we have not assumed that anything is known concerning the form or structural properties of our demand functions. Merely knowing that there will be a unique reaction to a given price and income situation puts no restrictions on that reaction. Fortunately, as I shall later

¹ This homogeneity assumption has been challenged by Mr. Keynes with respect to a different problem. For the pure theory of consumer's behaviour it is probably without objection. In any case it is always implicitly made.

show, it is possible to develop suitable restrictions so that our theory is more than formal.

Before doing so, it is convenient to develop certain additional relations. Substituting for I_1^0 its equivalent, we may rewrite set (2.0) in the following implicit form :

$$g^i(\beta_2, \dots, \beta_n, \psi_1 + \sum_{i=2}^n \beta_i \psi_i) - \psi_i = 0 \quad (i=2, \dots, n) \quad (3.0)$$

These are $(n-1)$ implicit functions involving $(2n-1)$ variables. Assuming that the conditions of the implicit function theorem are met in the region under discussion (and from later assumptions this will be likely), we may solve explicitly for the $(n-1)$ β 's in terms of the n quantities ; i.e.,

$$\beta_i = \beta_i(\psi_1, \dots, \psi_n) \quad (i=2, \dots, n) \quad (4.0)$$

As before, nothing is known of the form of these functions in the absence of additional assumptions. It remains only to introduce some appropriate restriction to limit the form of our various functions.

To do so, I suggest the consideration of matters lying close to the modern theory of index numbers.

Let us consider an initial price and income situation.

$$(p_1, \dots, p_n, I)$$

Corresponding to this set there is a given set of consumer's goods bought.

$$(\psi_1, \dots, \psi_n)$$

Now consider a second set of prices and income.

$$(p'_1, \dots, p'_n, I')$$

and

$$(\psi'_1, \dots, \psi'_n)$$

I introduce a bracket notation to indicate the following sum :

$$[\psi p] = \psi_1 p_1 + \psi_2 p_2 + \dots + \psi_n p_n = \sum_{i=1}^n \psi_i p_i$$

or

$$[\psi p'] = \psi_1 p'_1 + \psi_2 p'_2 + \dots + \psi_n p'_n = \sum_{i=1}^n \psi_i p'_i$$

Suppose now that we combine the prices of the first position with the batch of goods bought in the second. The total cost of such a batch would be

$$[\psi' p] = \sum_{i=1}^n \psi'_i p_i \quad (5.0)$$

If this cost is less than or equal to the actual expenditure in the first period when the first batch of goods was actually bought, then it means that the individual could have purchased the second batch of goods with the price and income of the first situation, but did not choose to do so. That is, the first batch (x) was selected over (x'). We may express this symbolically by saying

$$[\psi'p] \leq [\psi p] \quad (5.11)$$

implies

$$(\psi') \odot (\psi) \quad (5.12)$$

The last symbol is merely an expression for the fact that the first batch was selected over the second. A reversal of the inequality sign could have the meaning that the second batch was selected over the first.

By analogous reasoning

$$[\psi p'] \leq [\psi' p'] \quad (5.21)$$

implies

$$(\psi) \odot (\psi') \quad (5.22)$$

By the usual rules of logic

$$(\psi) \otimes (\psi') \quad (5.31)$$

implies

$$[\psi p'] > [\psi' p'] \quad (5.32)$$

since the negation of a consequence negates the antecedent.

Postulate III. I assume the following consistency in our idealised individual's behaviour. In any two price and income situations and corresponding quantities of consumer's goods given by equations (1.0) the individual must always behave consistently in the sense that (5.12) and (5.22) cannot hold simultaneously. Symbolically, we may write Postulate III

$$(\psi') < (\psi) \quad (6.01)$$

implies

$$(\psi) \nless (\psi') \quad (6.02)$$

In words this means that if an individual selects batch one over batch two, he does not at the same time select two over one. The meaning of this is perfectly clear and will probably gain ready acquiescence. In any case the denial of this restriction would render invalid all of the former analysis of consumer's behaviour and the theory of index numbers as shown later.

Surprisingly enough, from this assumption and from this alone, it is possible to develop important restrictions on our demand functions.

Let us suppose

$$[\psi'p] = [\psi p] \quad (7.01)$$

This implies from (5.11) and (5.12)

$$(\psi') \odot (\psi) \quad (7.02)$$

which implies from (6.01) and (6.02)

$$(\psi) \otimes (\psi') \quad (7.03)$$

which implies from (5.31) and (5.32)

$$[\psi p'] > [\psi' p'] \quad (7.04)$$

To summarise the argument

$$[\psi'p] = [\psi p] \quad (7.01)$$

implies

$$[\psi p'] > [\psi' p']^1 \quad (7.04)$$

Without loss of generality let us write

$$\psi_i' = \psi_i + \Delta \psi_i; \quad p_i' = p_i + \Delta p_i$$

(7.01) and (7.04) become

$$[(\psi + \Delta \psi)p] = [\psi p] \quad (8.01)$$

and

$$[\psi(p + \Delta p)] > [(\psi + \Delta \psi)(p + \Delta p)] \quad (8.02)$$

Dropping the bracket notation

$$\sum_{i=1}^n (\psi_i + \Delta \psi_i) p_i = \sum_{i=1}^n \psi_i p_i \quad (8.01)$$

$$\sum_{i=1}^n \psi_i (p_i + \Delta p_i) > \sum_{i=1}^n (\psi_i + \Delta \psi_i) (p_i + \Delta p_i) \quad (8.02)$$

Setting the price of the first good equal to unity and using the notation previously defined

$$\psi_1 + \Delta \psi_1 + \sum_{i=2}^n (\psi_i + \Delta \psi_i) \beta_i = \psi_1 + \sum_{i=2}^n \psi_i \beta_i \quad (9.01)$$

$$\psi_1 + \sum_{i=2}^n \psi_i (\beta_i + \Delta \beta_i) > \psi_1 + \Delta \psi_1 + \sum_{i=2}^n (\psi_i + \Delta \psi_i) (\beta_i + \Delta \beta_i) \quad (9.02)$$

¹ This means in the theory of index numbers that if the Laspeyres quantity index is equal to one, then the Paasche quantity index must be less than one. This provides a possible statistical check on the hypotheses underlying various index number studies.

By algebraic cancellation of terms this becomes

$$\Delta\psi_1 + \sum_{i=2}^n \beta_i \Delta\psi_i = 0 \quad (10.01)$$

$$\Delta\psi_1 + \sum_{i=2}^n \beta_i \Delta\psi_i + \sum_{i=2}^n \psi_i \Delta\beta_i < 0 \quad (10.02)$$

By substitution from the first of these expressions we may simplify the second.

$$\sum_{i=2}^n \psi_i \Delta\beta_i < 0 \quad (10.03)$$

It will be noted that these are identically the conditions derived by Georgescu-Roegen in his admirable article,¹ conditions here derived exclusively from our three simple postulates. In our notation, however, the β_i stand for actual price ratios and not hypothetical indifference directions.

From now on we may parallel Georgescu-Roegen's mathematical analysis. Letting our second point approach the first we have the following condition holding in the limit :

$$d\psi_1 + \sum_{i=2}^n \beta_i d\psi_i = 0 \quad (11.01)$$

$$\sum_{i=2}^n \sum_{j=1}^n \beta_{ij} d\psi_i d\psi_j < 0 \quad (11.02)$$

where $\beta_{ij} = \frac{\partial \Sigma_i}{\partial \psi_j}$ in the functions defined in (4.0). These

two conditions together imply, as Georgescu-Roegen has shown, that the following quadratic form be negative definite.

$$\sum_{i=2}^n \sum_{j=1}^n (\beta_{ij} - \beta_i \beta_{j1}) \xi_i \xi_j < 0 \quad (12.0)$$

This requires that the principal minors beginning with the third of the following determinant be alternately negative and positive.

$$- \begin{vmatrix} 0 & 1 & \beta_2 & \dots & \beta_n \\ 1 & 0 & \beta_{2,1} & \dots & \beta_{n,1} \\ \beta_2 & \beta_{2,1} & 2\beta_{2,2} & \dots & \beta_{2,n} + \beta_{n,2} \\ \cdot & \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot & \cdot \\ \beta_n & \beta_{n,1} & \beta_{n,2} + \beta_{2,n} & \dots & 2\beta_{n,n} \end{vmatrix} \quad (12.01)$$

¹ "The Pure Theory of Consumer's Behaviour," *The Quarterly Journal of Economics*, Vol. L, August, 1936, pp. 545-593.

i.e.,

$$-\begin{vmatrix} 0 & 1 & \beta_2 \\ 1 & 0 & \beta_{2,1} \\ \beta_2 & \beta_{2,1} & 2\beta_{2,2} \end{vmatrix} < 0; -\begin{vmatrix} 0 & 1 & \beta_2 & \beta_3 \\ 1 & 0 & \beta_{2,1} & \beta_{3,1} \\ \beta_2 & \beta_{2,1} & 2\beta_{2,2} & \beta_{2,3} + \beta_{3,2} \\ \beta_3 & \beta_{3,1} & \beta_{3,2} + \beta_{2,3} & 2\beta_{3,3} \end{vmatrix} < 0 \quad (12.02)$$

In the absence of the assumption of integrability the quadratic form in (12.0) is not symmetrical, which apparently Allen overlooked in his exposition.

Concerning the question of integrability I have little to say. I cannot see that it is really an important problem, particularly if we are willing to dispense with the utility concept and its vestigial remnants. Thus, Georgescu-Roegen's demonstration of the spiral-like behaviour of indifference varieties projected upon the budget plane at the point of equilibrium, while acute and illuminating, in no way changes matters if the point of view advanced here is accepted. The only possible interest that integrability can have (except to those who have an historical attachment to the utility concept) would be in providing us with additional knowledge concerning a certain reciprocal relation, namely,

$$\beta_{i,j} - \beta_j \beta_{i,1} = \beta_{j,i} - \beta_i \beta_{j,1} \quad (i, j = 2, \dots, n) \quad (13.0)$$

But it is this very implication which makes it doubtful and subject to refutation under ideal observational conditions, although I have little faith in any attempts to verify this statistically. I should strongly deny, however, that for a rational and consistent individual integrability is implied, except possibly as a matter of circular definition.

It remains now only to translate our restrictive conditions on the functions (4.0) into direct restrictions on our demand functions.¹ We may rewrite (8.01) and (8.02) in the form

$$\sum_{i=1}^n p_i d\psi_i = 0 \quad (14.0)$$

$$\sum_{i=1}^n dp_i d\psi_i < 0 \quad (14.1)$$

where not all dx_i vanish, i.e., where not all prices are allowed to vary in the same proportion.

From (1.0)

$$d\psi_i = \sum_{j=1}^n b_j^i dp_j + b_i^i dI \quad (i = 1, \dots, n) \quad (14.2)$$

¹ I should like to express my indebtedness to Mr. Rollin Bennett for his valuable aid in much that follows.

But

$$dI = \sum_{j=1}^n \psi_j dp_j + \sum_{j=1}^n p_j d\psi_j \quad (14.3)$$

However from (14.0), this may be written

$$dI = \sum_{j=1}^n \psi_j dp_j \quad (14.4)$$

Hence,

$$d\psi_i = \sum_{j=1}^n (b_j^i + b_i^i \psi_j) dp_j \quad (i=1, \dots, n) \quad (14.5)$$

Therefore (14.1) becomes

$$\sum_{i=1}^n \sum_{j=1}^n (b_j^i + b_i^i \psi_j) dp_i dp_j < 0 \quad (15.0)$$

for not all prices varying proportionately.

Defining¹

$$\alpha_{ij} = b_j^i + b_i^i \psi_j + b_i^j + b_j^j \psi_i = \alpha_{ji} \quad (15.1)$$

our direct conditions on the demand function are that the n^2 quadratic form be negative *semi-definite*²

$$\sum_{i=1}^n \sum_{j=1}^n \alpha_{ij} dp_i dp_j \leq 0 \quad (16.0)$$

where the equality holds only for all prices changing in proportion. Because of our homogeneity condition, the n^2 determinant corresponding to this form vanishes identically,

$$|\alpha_{ij}| \equiv 0 \quad (17.0)$$

Our final conditions are that every $(n-1)^2$ minor of this determinant must have been formed from the coefficients of an $(n-1)^2$ negative definite form. Briefly, it is necessary that the following minors alternate in sign for any ordering of variables.

$$\alpha_{ii} < 0; \begin{vmatrix} \alpha_{ii} & \alpha_{ij} \\ \alpha_{ji} & \alpha_{jj} \end{vmatrix} > 0, i \neq j; \begin{vmatrix} \alpha_{ii} & \alpha_{ij} & \alpha_{ik} \\ \alpha_{ji} & \alpha_{jj} & \alpha_{jk} \\ \alpha_{ki} & \alpha_{kj} & \alpha_{kk} \end{vmatrix} < 0, i \neq j \neq k \neq i; \text{ etc.} \quad (18.0)$$

Even if the approach outlined here is not accepted, these conditions are the direct restrictions imposed upon our demand function as the result of the usual stability or "concavity" conditions. The translation of these conditions into terms of elasticity coefficients of price and income is of course always possible, but is somewhat tedious and

¹ In the integrable case, the form will be already symmetrical.

² See M. Bocher, *Introduction to Higher Algebra*, p. 150.

is not given here. It is my feeling that much of the modern work has been rendered unnecessarily lengthy and involved because of a preoccupation with elasticity expressions, which are essentially redundant, since it is always possible to utilise a developed mathematical theory in expressing the conditions on the various partial derivatives directly. However, if this is desired, it is possible to make use of the following relationship derivable directly from the homogeneity assumption by Euler's Theorem :

$$N_{i1} + N_{i2} + \dots N_{in} + N_{ir} = 0 \quad (i = 1, \dots, n) \quad (19.0)$$

where the N 's stand for elasticity coefficients.

In the case of two commodities our conditions take the following simple form :

$$\left. \begin{aligned} N_{11} + N_{12} + N_{1r} &= 0 \\ N_{21} + N_{22} + N_{2r} &= 0 \end{aligned} \right\} \quad (20.0)$$

and

$$\left. \begin{aligned} N_{11} + k_1 N_{1r} &< 0 \\ N_{22} + k_2 N_{2r} &< 0 \end{aligned} \right\} \quad (20.1)$$

where k represents the proportion of total income spent on the respective commodities.

Concerning definitions of complementarity, I have little to say. It is my personal opinion that the subject has received more attention than would seem justifiable. In other isomorphic equilibrium systems, e.g., the equations of analytic dynamics, or the Gibb's system of thermodynamic equilibrium, it is not felt to be necessary to define similar measures.

Historically, of course, the study of complementarity has been of great importance, since it was in the pursuance of this subject that the inconsistency in the thought of Pareto and the redundancy of the utility concept was revealed. Pedagogically, its introduction may be very desirable.

In concluding this exposition, it may be well to sound a warning. Woe to any who deny any one of the three postulates here! For they are, of course, deducible as theorems from the conventional analysis. They are less restrictive than the usual set-up, and logically equivalent to the reformulation of Hicks and Allen. It is hoped,

however, that the orientation given here is more directly based upon those elements which must be taken as *data* by economic science, and is more meaningful in its formulation. Even if this will not be granted, the results given in (18.0) are a useful extension of the restrictions in the older analysis, being directly related to the demand functions.

I have tried here to develop the theory of consumer's behaviour freed from any vestigial traces of the utility concept. In closing I should like to state my personal opinion that nothing said here in the field of consumer's behaviour affects in any way or touches upon at any point the problem of welfare economics, except in the sense of revealing the confusion in the traditional theory of these distinct subjects.

Family Incomes and Personal Incentives

By P. FORD

THE purpose of this statistical investigation was to ascertain the magnitude and relative importance of the different sources of working class family income, and the extent to which persons of different degrees of filial relationship help to maintain other members of the family. Estimates of the volume of "statistical poverty" are made by assuming that the entire incomes of the individual members of families are placed into a pool and used for meeting aggregate expenses on a defined level. Such studies are useful in measuring progress over periods of time, and for inter-local comparisons of standards, but if they are to throw light on the incentives of individuals, further analysis is necessary. First, in many ways the economic actions of the head of the family are based on a consideration of the sources and permanence of the various parts of the family income, as well as on its aggregate amount. Thus, a substantial proportion of overcrowded families have been found to possess total family incomes large enough to bear somewhat higher rents than they are paying. But they are families with earning sons and daughters, who might at any time leave the household for marriage or work, and the heads of such households may well hesitate to commit themselves to a higher fixed rent charge in such circumstances. Secondly, the current discussion of means tests has drawn attention to the mutual obligations of the members of the family, and to their contributions to, or drawings from the family pool. There is little statistical information on these points. Yet without it we cannot assess the practical effect of adopting different bases for the assessment of needs, such as those implied in the terms "individual" or "household" means test, nor can we gauge their effect on personal incentives,

To achieve the object of the inquiry it was necessary to compare the situation of special groups subject to one of the major means tests against that of the normal working-class population. (1) Data collected on a standard basis by the U.A.B. provided an obvious source for the former branch of the enquiry. (2) In the case of the normal sample, it was desirable to have some measure of the movement over periods of time, as well as examples of areas of different economic constitutions at similar dates. By the courtesy of Professor Bowley a one in two sample of the cases of the "Five Towns" surveys of 1913-14 and 1923-24 was examined. The information as to the sources of income and the family relationship existing between members of the household was required in considerable detail and precision. Unfortunately for these reasons the 1914 cards for Bolton and Reading could not be used. (3) These were supplemented by cards of the Southampton Survey (1931) and a one in ten sample of the London survey cards (1929-30). This article is concerned with the "normal" samples and some comparisons with groups subject to the means test.

Since the essence of the work was to find out to what extent the family income was derived from the head or from various other members of the family, and what relatives were supporting or being supported by the "head," the definition of "head" is vital. It is also the chief difficulty, and one from which the ordinary poverty surveys, which simply aggregate income, are fortunately free. In the simple case he is the father with dependent and perhaps some earning children, but the variety and complication of the households are endless; indeed, there seems no conceivable combination of relationship and financial arrangement which cannot be found in any normal sample. There are odd cases of two persons receiving an income which is jointly earned, others where the household seems to be rather a resting place of individuals leading separate lives even from an economic point of view. There was one household of four male old pensioners all over seventy-five, and all apparently unrelated. Again, in the course of his life a man passes from a period of complete or semi-dependency into one of responsible headship, and finally, when living with a son or married daughter, dwindles into economic as well as biological insignificance; the effective leadership then lies with the younger generation. Neither the test

of being the father of dependent children in the household, nor the chief earner, nor the holder of the rent book, is always conclusive. He may be the parent of the only dependent children, but not the chief earner or even their main supporter. In periods of rent control the possession of the rent book is not conclusive evidence since the desire to avoid the creation of a new tenancy would lead to its retention by the older people, although in fact the rent was paid by others. Again there are aggregations of brothers and sisters, aunts and cousins, thrown together by distress, breakdown of marriage, or failure to marry, where there are no dependents at all. These difficulties, brought out sharply by attempts to handle the material, are not of course simply the creation of this particular statistical investigation. In various social services the household has to be defined, and on occasion some decision made as to which person is the head of the house. Fortunately, these complications, though wide in their variety and not always easy to handle, can be dealt with by expanding the usual definition of the head of the "natural family," and the residue of arbitrary decision is not large enough to damage the comparability of the figures. In the standard poverty surveys, the husband in an ordinary family, or his widow, is regarded as the head of the household, but where married sons or daughters are also living in the family, the married man of the younger generation is counted head.¹ This definition was modified or supplemented by other rules, of which those for deciding the position of widows were the most important as regards the number of cases they affected. Where there is a widow and an adult earning son, the son is the head. Where besides the widow there are adult earning daughters, the member of the family who normally contributed most is head. But where the widow still has dependent children, she is head, even if there are adult earning children living with her. In the standard definition given above a married man living with parents is counted head, but this does not fit the case where the younger generation has no children and the father with whom they are living still has one or more dependent on him. The father is then counted as head. Where both older and younger generation have dependent children—

¹ *New Survey of London*, Vol. III, p. 414; *Merseyside Survey*, Vol. I, p. 317; P. Ford, *Has Poverty Diminished?*, pp. 28-29; *Work and Wealth in a Modern Port*, p. 203.

there was one case where mother and daughter in the same household had babies in the same month—the decision was somewhat arbitrary and was made on the facts of the case.

The first two tables set forth the sources and make-up of the household income. Since 1913-14 the average family has decreased in size, but increased in the numbers of earners relatively to non-earners, and the scope of the social services has been enlarged. Table I shows how far the sources from which the family have drawn their income have widened, while Table II takes account also of changes in the absolute amounts earned by the various groups, and in the amounts of social service payments, as well as of the occasion on which the payments are received. Heads' wages, etc., include income from property and also wife's earnings. As the average amounts received from these additional sources are small, it is convenient in the first analysis to class them together.

TABLE I
SOURCES OF FAMILY INCOME
PERCENTAGE OF FAMILIES RECEIVING INCOME FROM VARIOUS SOURCES

	Northampton, 1914	Warrington, 1914	Stanley, 1914	Northampton, 1924	Warrington, 1924	Stanley, 1923	Reading, 1924	Bolton, 1924	Southampton, 1931	London, 1929-30
Heads' Wages only ..	49.0	54.0	64.5	50.1	34.6	52.5	47.9	48.6	31.9	52.7
Social Income only ..	1.0	—	1.0	1.6	2.9	1.7	3.3	3.9	14.7	5.6
Other Earners' Wages only	2.4	1.4	—	1.1	2.1	0.7	0.6	1.6	0.4	0.7
Heads' Wages, etc., and Social Income ..	3.3	1.7	3.1	7.1	6.4	10.7	12.3	4.3	15.6	8.5
Heads' Wages, etc., and other Earners' Wages	40.0	38.8	26.3	34.7	40.3	28.7	29.3	34.1	19.5	25.8
Social Income and other Earners' Wages	1.0	—	1.0	2.1	5.6	0.7	1.8	4.5	7.7	2.0
Heads' Wages, etc., other Earners' Wages and Social Income ..	3.3	1.4	4.1	2.8	7.7	4.3	4.5	3.0	10.0	4.5
No Income	—	2.7	—	0.5	0.4	0.7	0.3	—	0.2	0.2
All	100	100	100	100	100	100	100	100	100	100
Total Families in Sample	331	292	194	435	484	299	334	440	559	2510

From Table I it is plain that:—(1) In Northampton, Warrington and Stanley, the percentage of families receiving

income from other earners' wages changed from 47 per cent., 41 per cent., and 31 per cent. respectively in 1913-14 to 41 per cent., 56 per cent. and 34 per cent. in 1923-24. For Southampton and London the figures are 38 per cent. and 33 per cent. (2) In the same three towns in 1913-14 the percentage of families receiving social service income was 8 per cent., 3 per cent. and 9 per cent.; by 1923-24 these figures had risen to 14 per cent., 23 per cent. and 17 per cent. The figures of 21 per cent. and 48 per cent. for London and Southampton reflect the onset and severity of the great depression in those centres.

The second table gives a picture of the composition of the average income. The means test used in unemployment assistance, though it has attracted most attention, is only one of a number operating in the social services. A local authority may be administering a form of test in ten or more separate services, varying from public assistance to maternity, school meals or the grant of special places in secondary schools. The vital point in all such tests is how widely the unit of mutual obligation is defined. According to replies to a questionnaire issued to all county boroughs, (a) some take account of parents' income only; (b) others bring into the assessment of available resources the incomes of all persons who can be regarded as more or less permanently participating in the household, with certain specified exemptions. (c) Some treat supplementary earners as lodgers and take account only of their "profit" to the family; yet other authorities exempt some arbitrary proportion of their incomes, deemed to be necessary for personal expenses. (d) Parent's income plus incomes of sons and daughters was suggested as the normal unit for unemployment assistance by the Royal Commission on Unemployment Insurance, and is used in some educational services. Not only may an authority be using different bases of assessment for different services, but in any given service one authority may take account of parent's income only, while another may ascertain the resources of the entire household before making its decision.

From Table II can be gathered what the income of the families would be on some of these methods of assessments. The first row of the table shows what the assessed income would be on a "parent's" or "head's" means test. The second shows the addition which would be made on a family

TABLE II
COMPOSITION OF FAMILY INCOMES
AVERAGE

	Northampton, 1914	Warrington, 1914	Stanley, 1914	Northampton, 1924	Warrington, 1924	Stanley, 1923	Reading, 1924	Bolton, 1924	Southampton, 1931	London, 1929-30
Heads' Income ..	27/3	27/2½	36/4	54/7	52/5	47/0½	48/7	58/2	42/9	55/6
Sons' and Daughters' Income ..	10/6	6/9	8/7	17/8	23/11	10/10½	11/4	17/9	11/1	13/4
Other Earners' Income ..	1/10½	3/3	2/1½	6/8	10/11	3/7½	5/11	7/6	3/5	3/4
Adult Non-earners' Income ..	4d.	3½d.	6½d.	7d.	7d.	10d.	1/10	7d.	1/1	4d.
TOTAL ..	39/11½	37/6	47/7	79/6	87/-	62/4½	67/8	84/-	58/4	72/6
Heads' Wages, etc. ..	27/0½	27/4	36/-	53/7	48/10	44/10½	46/7	55/5	35/4	52/2
Other Earners' Wages ..	12/4½	10/-	10/8	23/5	33/6	14/5	17/-	25/11	12/10	16/3
Social Income ..	6½d.	2d.	11d.	2/6	4/8	3/1	4/1	2/8	10/2	4/1
TOTAL ..	39/11½	37/6	47/7	79/6	87/-	62/4½	67/8	84/-	58/4	72/6

means test, where "family" is defined as the "natural" family, while the total indicates the aggregate income of the household if no portion of other earners' income were exempt from assessment. It will be observed that (1) the income of supplementary earners in Northampton, Warrington and Stanley in 1913-14 was equal to 39 per cent., 37 per cent. and 29 per cent. of the head's income. By 1923-24 it had risen to 44 per cent., 65 per cent. and 31 per cent., but in Northampton there had been an actual decrease in the number of earners in the average family, while in Warrington the number rose by only 0.35, from 1.81 to 2.16 earners per family. It is the rise of the income of these other earners, not merely the increase in their number, which is the important movement. (2) In the three comparable towns social service payments have increased from small sums in 1913-14 to from 3 per cent. to 5 per cent. of the total income. The absolute amounts are important for in 1924 they were equal to just under one-third to over three-fifths of the average net rent expense. The significance of the sums in the family economy can be seen by the fact that in London 3.8 per cent. of the families were above and 3.27 per cent. below the poverty datum line by amounts up to five shillings, while the average sum received by all families from the social services in this area was 4s. 1d.

In Southampton, 18 per cent. were above and 15 per cent. below the poverty datum line by sums up to 10s.; the average sum received from the social services was 10s. 2d.

In *Has Poverty Diminished?* an attempt was made to estimate the main sources of the reduction of poverty in the Five Towns in the ten years which separated the two surveys. It was found that about 27 per cent. of the reduction could be attributed to diminished needs owing to the fall in the number of dependent children, while the residue of the total reduction of 43 per cent. (measured by the actual week of investigation) was due to "rise of wages" (including head's wages). The breakdown of the family income into its constituents enables us to carry the analysis further, and to point more precisely to some of the operative factors. If we put together the above facts and those given on pages 75 and 76, we can see that an increase in other earners' income as distinct from a rise in the numbers of such earners, and in the income from social services, were the chief sources of improvement. Many of the supplementary earners were juveniles and women.

One of the questions raised by the means test controversy was whether the effect of the regulations was to extend unduly the responsibility for keeping relatives. Before we can say whether a person is being "supported" by someone else, a precise meaning must be given to the term. We could make the question one of fact, as with Unemployment Assistance, or we could say as in the Unemployment Insurance rules, that a man is keeping an adult dependent if he contributes to the family fund more than half the cost of maintenance, defined as the average income per head of the family. For the present purpose it seemed better to ask not only whether the aggregate family income was sufficient to keep the family as a whole above the poverty line, but whether the head were able to keep himself and his dependents in this condition, and if not, whether he was being maintained above the line by other groups in the family. This is the kind of question which is in the public mind, and Tables III and IV show what the facts are for normal samples of the working class population. It was assumed that the head of the family should keep himself and his dependents, and pay the rent. If he were unable to maintain them at the poverty datum line, and if further, other groups in the household had an income

more than sufficient to cover the cost of keeping themselves at that level, their surplus was regarded as available to make up his deficiency; they were then wholly or partly "supporting" him and his dependents. If the head had sufficient income, or if neither the head nor the other earners could meet their needs on this basis no question of responsibility or support arose. This procedure made it necessary to define the minimum need or poverty datum line. It would have been convenient if a new one could have been drawn, which would incorporate current authoritative views of physiologists on minimum diets, such as one of the B.M.A. scales. But it is impossible to recapture local retail prices in sufficient detail for this purpose. The poverty line used in the various surveys was therefore accepted as it stood. This was uniform for the Five Towns, but is slightly modified in the London and Southampton surveys. In terms of cost the differences are slight and would have an inconsiderable influence on the comparability of the results.

The responsibility of the earners of more distant relationship which has been discussed is not, of course, that meant by the U.A.B. in its regulations. The Board regards as members of the household persons who have grown up in it, whilst those joining later, say after the age of fourteen, are presumed not to be members if the facts show that they have not been supported by the household, but have paid a reasonable and remunerative rate for their board and lodgings. Generally, relatives-in-law are, for the purpose of assessment, assumed not to be members whose full incomes should be taken into account. In the present enquiry, the entire incomes of the household are reckoned as available to meet expenses at the minimum need level, and the table shows the extent to which the income of the more distant relatives must be drawn upon to keep the head and his dependents. No doubt, in practice, with the tolerance which is characteristic of the working class, it is often recognised that more distant relatives have a "right to their own," and the two groups in the household may for a time live on two different standards. How long such a position is maintained must depend in some degree on the amount of difference in standard and the length of time for which it persists. Tables III and IV show indirectly the pressure which all the circumstances place upon the

TABLE IV
PERSONAL RESPONSIBILITY
NUMBERS AND PERCENTAGE OF HEADS SUPPORTED BY VARIOUS
RELATIVES

	Northampton, 1914	Warrington, 1914	Stanley, 1914	Northampton, 1924	Warrington, 1924	Stanley, 1923	Reading, 1924	Bolton, 1924	Southampton, 1931	London, 1929-30
1 No. of Families where Head is wholly or partly supported ..	49	35	11	32	66	15	34	50	104	232
2 No. of Heads who are supported by :—										
(a) Relatives liable under Poor Law	45	34	10	30	42	14	28	40	92	205
Wife ..	6	6	2	8	6	2	5	4	18	47
Son(s) and/or Daughter(s) ..	33	26	6	17	32	8	19	34	60	118
Parent(s) ..	3	—	—	—	1	2	3	2	11	21
Grandparent(s) ..	—	—	—	—	—	—	—	—	—	—
Combinations of Relatives ..	3	2	2	5	3	2	1	—	3	19
(b) Relatives not liable under the Poor Law ..	1	1	—	1	10	1	3	4	7	18
(c) Relatives, some liable, some not liable under Poor Law ..	3	—	1	1	14	—	3	6	5	9
3 Total No. of Heads supported by Persons not liable under Poor Law										
2(b) and 2(c) ..	4	1	1	2	24	1	6	10	12	27
4 Percentage of Heads supported by Persons not liable under Poor Law ..	8	3	9	6	36	7	18	20	12	12

was 15 per cent., 12 per cent. and 6 per cent. of the total; in 1923-24 it was 10 per cent., 13 per cent. and 5 per cent. respectively. In London the proportion was 9 per cent., in Southampton 18 per cent. (2) The percentage of heads towards whose support relatives not liable were contributing is lower in the normal cases than in the U.A.B. groups in every centre where there are comparable figures, save two. (3) In few cases were the more distant relatives who had no direct legal liability bearing the sole responsibility of supporting the head; they were usually involved along with the closer relations who had. Brothers and sisters

were the most numerous of them, but brothers- and fathers-in-law, nieces, aunts, uncles, nephews and female housekeepers were included. (4) In Warrington and Bolton the percentage of heads whom non-labile relatives were helping to support was higher in the normal sample of 1924 than in those receiving Unemployment Assistance under a means test. And in Warrington the percentage *rose* between 1914 and 1924. What is the explanation of this result? The size of the actual household was being varied by the demands of economic life, and therefore the range of persons brought into this kind of liability was altering. In Warrington in 1914 there were 470.4 persons per hundred families, in 1924, 490.4. But the increase was almost entirely of persons of more distant relationship; those without poor law liability increased from 25.7 to 48.5 per hundred families, and the main increase was in nephews, nieces and relatives by marriage. The latter, including fathers-, mothers-, sons-, daughters-, brothers-, and sisters-in-law, rose from 3.7 to 25.5 per hundred families. Overcrowding was unusually heavy in Warrington and Bolton in 1921. By the census of 1931 there has been a substantial reduction of overcrowding in both towns, and the result is that the proportion of non-labile relatives contributing to the support of the head in the U.A.B. cases in these areas, when the families were being subjected to a means test, was actually less than in 1924. The number of persons free of statutory liability under the Poor Law who were members of households varies not only over periods of time, as with Warrington and presumably Bolton, but between area and area. In the U.A.B. centres, it is 45.0 per 100 families in Reading, but only 16.0 in Huddersfield and 22.9 in Bournemouth. In the normal sample, it varies from 14.0 per 100 families in London (E. External) to 6.5 in London (S.E.) and 20.1 in Southampton. While, therefore, the definition of the "household" seems stable, the actual group of persons included within it depends not only on family custom, but is contracted or expanded as a result of housing conditions, the migration of labour and other economic influences. No doubt there are nephews and nieces brought up by aunts and uncles between whom there is a close relationship somewhat similar to that between parents and children; but these changes show that there are important economic

factors at work in forming the household groups which do not give rise to the same sense of mutual obligation.

Quite apart from the difficulties created by these undercurrents of economic life, the attitude of the state towards incentives within the family is often confused and uncertain. From one set of relatives it may recover the cost of assistance granted to poor persons whilst others can evade any indirect burden by leaving the household. Sometimes it takes account of a man's dependents, as in Unemployment Insurance and Assistance, and outdoor relief; whilst in others, as in Health Insurance, it ignores them. Allowance may be made for an adult dependent other than a wife, if the applicant for benefit is unemployed, but such a person is ignored if he is sick. It is perhaps natural, therefore, that sometimes those in whose lives the services play a considerable part, should not be completely consistent either. If help is expected for an adult dependent when he is a liability, it is not easy to argue that none of his income should be brought into assessment when he is an asset. The phrase, "it is the household for better or worse" expresses the alternative contention. Nevertheless, the beneficiaries faced with the confusion of services, may well ask "What is the family?"

It is not necessary to enlarge upon the overlapping and gaps in provision which may arise from our present congeries of social services. The relevant point here is that they need tidying up in respect of the various conceptions of family obligations on which they rest. On this, as well as on other grounds, the services should be considered as a whole, and as far as possible the rules relating to them be drafted into a single social code. In determining the basis of assessment and obligation, and the rates of benefit, etc., financial as well as ethical views will play a part, and it may be suggested that an analysis of family income such as here attempted, forms part of the basis on which judgments of financial expediency must rest.

A Note on the Working of the Gold Standard

By M. L. HOFFMAN

MR. P. B. WHALE, in *ECONOMICA* for February, 1937, presents an argument which, if correct, vitiates both the neo-classical theory of the working of the pre-war gold standard and the newer monetary theorists' criticisms of the gold standard. He seems to prove that the changes in incomes, prices, and volume of payments necessary to bring about adjustment to a shift of demand for a country's exports come about "spontaneously," instead of being forced by changes in interest rates. The inference is that the gold standard could be (and, indeed, was) maintained without "playing the rules" as we have customarily defined them. This means that to some extent at least (Mr. Whale is never clear to what extent) the various central banks on the gold standard could adjust their discount rates independently of the movements in the international accounts.

Mr. Whale starts his disruption of international equilibrium by assuming a decline in the demand for one country's exports and, following Mr. Harrod, the resulting decline in income is traced from exporters through the rest of the economy. In the absence of counteracting influences, the contraction of incomes must proceed far enough and last long enough to restore the balance of payments. But incomes may be restored by dishoarding, in which case gold must flow out of the country and thus bring about lower prices of all goods, including the country's export goods. This is a particular case in which the operation of the two general types of corrective factors, shifts of demand (due to income changes) and shifts in relative prices, are put into a time sequence. It is perfectly good classical theory and, in its modern form, may be traced

back to Hume on the price change side, and to Wheatley and Ricardo on the demand change side.¹

But, continues Mr. Whale, there is another possibility which offsets the increases in incomes due to dishoarding, and this is that the firms affected by the decline in demand will reduce their bank loans and thus cancel money. Such counteracting influences as there may have been from the release of hoards will be prevented. "The significant point of difference between this and the classical view is that, according to this, the change in the volume of credit comes about, as it were, spontaneously without being induced by a change in interest rates."²

It is the purpose of this note to show that Mr. Whale has not really established a different process of adjustment from that recognized by the classical school, and has confused two general types of gold standard, to one of which his analysis applies, and to the other of which it does not.

In the first place, if there is flexibility of reserve ratios in the banking system, there will of course be no fixed relationship between international movements of gold and the national volume of credit. The destruction of loans on the part of those affected by the decline in demand will result in larger reserve ratios, and any resultant outflow of gold need not cause any further contraction—nor would any inflow necessarily cause an expansion. For practical purposes, unless a particular kind of variability in reserves is indicated, there will be no necessary relationship between gold movements and deposits. And if there is no known relationship, we are not dealing with the gold standard in the classical or neo-classical sense of that term. Criticisms of the mechanism outlined to fit either 100 per cent. reserves (the classical) or a system with given, fixed reserve ratios (the neo-classical) by citing a possible way of adjustment under variable reserve conditions is not legitimate or relevant. No classical writer would deny that under conditions of variable reserve ratios, the volume of money in the country depends on banking policy, and not on the movement of gold.

And here is where Mr. Whale's approach has something

¹ Both go much farther back, at least to the first half of the 18th century—Isaac de Bacalon (1746) who discussed changes in demand as an equilibrating factor; and the unknown author of the pamphlet on East India Trade (1702) who had a clear notion of the operation of price changes in bringing about adjustment. Particular references to these older writers will be found in the historical sections of Professor Viner's book.

² P. B. Whale, *ECONOMICA*, February, 1937, p. 24.

to contribute, for the process which he has (not too clearly) outlined, though supposed to apply to the pre-war gold standard in England and the United States, as well as in other countries, really applies only to those countries which held large reserves that they considered "excess," notably France. There, an outflow of gold was not a necessary condition for the change from a larger to a smaller volume of circulating medium, because the central bank was content to accumulate certain excess reserves.¹ Thus a shrinkage in incomes might persist under the circumstances which he has outlined. Of course, even here, there is no assurance that the shrinkage in incomes and changes in demand alone would adjust the balance of payments. The excess reserves of the system might become exhausted before this occurred, particularly if other countries closely connected to this one were using the same sort of banking policy (i.e., were "offsetting"). But it would, in this case, really be true that the outflow of gold had little or nothing to do with the credit structure.

Since the policy of holding large excess reserves is apparently going to be the current form of the gold standard for some time to come, this analysis is very useful. It is unfortunate, however, that it should be presented as in opposition to the classical analysis, when it is in reality dealing with an entirely different case, and in a manner which is distinctly not in opposition to anything involved in the classical statement.

However, it is my impression that the variable reserve ratio case is not clearly distinguished by Mr. Whale from the customary case where reserve ratios are fixed. And in this case, his spontaneous destruction of credit seems to leave the matter in mid-air.

When loans are paid off by those who have suffered losses due to some falling off of demand from abroad (I shall use this particular example, though I do not consider it typical or important), one of three things must happen under gold standard conditions with fixed reserve ratios. Either: (1) new loans will be immediately made at the same rate of interest (to anyone whatever) in order to

¹ An outflow of gold would still be a necessary accompaniment of the adjustment, as Mr. Whale rightly maintains in his discussion of the case of a capital transfer, which is identical in its effects with that of an independent change in demand. *Op. cit.*, p. 29. But the magnitude of the outflow would not affect the rapidity or slowness of the fundamental adjustment.

bring the ratio of reserves to loans back to normal; or, (2) if new loans cannot be made at the old rate of interest, the interest rate will be lowered; or, (3) excess reserves would continue in existence for a short period, and the outflow of gold would come out of these. In either of the first two cases, there would be no real reduction in the volume of monetary payments in the country (except that occasioned by the different spending habits of the new borrowers), and a gold outflow would be necessary in order to bring about such a reduction. This is the neo-classical case. The mere fact of a priority in time of the "spontaneous" reduction has led Mr. Whale to confuse the causal relationship. It may be true that this reduction comes "first," but it does not result in a net reduction in credit volume until and unless a decline in reserves comes about through loss of gold. The decline in reserves brings a primary as well as a secondary reduction in deposits, and thus leads to falling export prices and/or decreased demand for imports, or for exportable goods consumed in the past at home.

It is the third case which seems to involve some difficulties, and it is only this case which Mr. Whale discusses. He says that it might be argued that the natural rate of interest has fallen, and that the failure of the money rate to fall is equivalent to a rise. He thinks, however, that there is a difference between a change in demand for loans resulting from a change in the demand for products and one due to a change in the marginal productivity of capital. He supports this belief with some unconvincing argument in which he drags in unnecessary concepts, such as the structure of production, and seems to me to prove nothing.¹ What he does not, as far as I can determine, seem to see is that it is not possible for there to be a change in the demand for loans at the same rate of interest unless there is, in fact, a fall in the schedule of marginal efficiency of capital. Or, to say it in another way, a change in the "aggregate demand for products" will not affect the demand for loans at all unless it affects it through the marginal efficiency of capital schedule.

If situation three arises, therefore, it means, *ipso facto*, a change in the current estimate of marginal capital efficiency which is not reflected in the money rate of interest. It is, therefore, by no means spurious to argue that the failure

¹ Op. cit., pp. 24-5. I cannot make head or tail out of this argument.

of the rate to fall has the same effect on the mechanism of adjustment as a rise in the rate. It keeps the volume of credit money below what it would have been had there been no disturbance to the international balance. If the "excess" reserves flow out of the country, the money rate will not be changed. But if the banking policy is one of fixed reserve ratios, the money rate will soon be lowered, which brings us back to case two. Is the loss of gold which prevents this occurrence a result of the decline in volume of payments, as Mr. Whale thinks, or a cause, as the neo-classical analysis holds. There seems to me to be no question that if the exodus of gold does not take place, the decline in credit volume would not persist. And if this decline does not persist, the international balance could not reach equilibrium, for reasons recognized by Mr. Harrod and Mr. Whale himself. In this sense, I submit, the loss of gold may be reasonably said to be the "causal" factor in regard to the volume of money in a country under the old gold standard. The "spontaneous" destruction of credit will in itself not result in an adjustment of the international balance because, with a fixed reserve ratio policy, it will not continue. It does not make changes in gold reserves any less causal to show that they are necessary to *support* changes in the credit structure instead of themselves being prior in time to such changes, and this has long been recognized by quantity theorists.

It should also be noted that the theory of the adjustment of international balances gives no justification to the banking school doctrine of short term loans, as Mr. Whale hints in closing.¹ The destruction of money by private banks has eventually to be supported, as I hope to have shown, by a loss of reserves. If the banking school theory is applied, this loss of reserves will result in multiple contraction of the currency, and all the other evils commonly said to be associated with such contraction. There is no assurance that such contraction will not be greatly in excess of the amount eventually necessary to fit the new state of affairs. In fact, it is probably the excessive expansion and contraction of the volume of bank money which gives rise to the correlations between high prices and gold inflows, and low prices and gold outflows noted by Mr. Whale. For such a correlation indicates that the inflow of capital, due to attractive interest

¹ Op. cit., p. 32.

rates, is more than sufficient to offset the tendency for the balance of trade to turn against the high price country. The inflationary operation of the banking system under the proportional reserve system (the banking school theory applied to deposits, which is what we now have) keeps the prospective marginal efficiency of capital, and thus market interest rates, very high. Far from being an aid to correction, therefore, the banking school doctrine appears more generally to be an underlying cause of the swings of the trade cycle, and thus of gold movements. On the "down" side, of course, multiple contraction results in serious exaggeration in the other direction, and this is necessarily true unless, along with fractional reserves, the system carries large reserves which it considers to be "excess" reserves.

A Note on the Working of the Gold Standard: A Reply

By P. BARRETT WHALE

I am afraid Mr. Hoffman has somewhat misapprehended the main drift of my argument. To avoid extensive restatement, I give my reply in the form of a series of points.

(1) The conditions on which my argument is based are those which I believe to have existed generally in the gold standard countries before the war. There was, I think, a certain amount of flexibility in reserve ratios in most countries, including our own, but this did not usually extend far enough to dispense with the necessity of accompanying changes in gold reserves by changes in fiduciary money, i.e. notes or deposits covered by earning assets. Taussig with his reference to the different degrees of sensitivity of monetary systems to specie movements has the same conditions in mind.

(2) My analysis certainly does not depend on flexibility of reserve ratios. For clearly it is only when changes in reserves require to be accompanied by changes in fiduciary money that the problem with which I am concerned arises. The classical (better called, I admit, the neo-classical) theory says that the changes in reserves compel the monetary authorities to take action, by changing the terms of lending, to adjust their earning assets. My suggestion is that the same cause which is responsible for the specie movement, namely the change in the course of trade, may simultaneously alter the demand for loans at the same interest rates. A certain flexibility of reserve ratios would merely simplify the process in so far as these concurrent changes in reserves and liabilities were not exactly proportional. Adherence to rigid reserve ratios would in that case admittedly call for some action by the monetary authority; but this might affect the reserves themselves (through influencing short

term capital movements) as well as the volume of earning assets.

(3) Mr. Hoffman seeks to rehabilitate the neo-classical theory by arguing that, given rigid reserve ratios, the state of the reserve is the cause of the volume of liabilities, since if the reserves were different the liabilities would also have to be different. Apart from ignoring the possibility that monetary requirements may in some cases determine the amount of the reserves, this way of putting the matter does not really touch my question as to how the changes in the volume of liabilities, or bank money, come about. If the further step is added to the argument to the effect that the volume of money (liabilities) determines the range of prices within the country, I think the causal sequence may be misrepresented.

I may explain, however, that in saying that "changes in reserves may be the accompaniments and not the causes of the change in the volume of credit," I meant that the new borrowings or repayments (as the case may be) might be a result of changes in the demand side of the loan market. I would agree that the fact that the banks accept these changes in credit and do not seek to resist or offset them is attributable to the change in their reserve position.

(4) The more obvious practical consequences that would follow if my view is correct are that a less active rôle is assigned to central banks in the process of adjustment and that the need for divergent movements of interest rates is reduced. I think we have a better explanation, too, of the smoothness and rapidity with which adjustments have often been made—the point which puzzled Taussig. A further, more complicated, point which I considered was whether a process which dispensed with changes in discount and interest rates would not be free from some of the objections urged against the gold standard on the score of the disturbances which it imposes from time to time on investment. I recognised that a divergence between natural and market rates can occur without the market rate changing, and that a change in the amount borrowed from the banks at the same rate of interest would usually be regarded as such a case. But I suggested that a distinction ought to be made between a change in the amount borrowed at a given rate as a result of a change in the value of output and a change

in the amount borrowed as a result of changes in the productivity of "roundabout" processes. The point of the distinction is that in the former case there is less likelihood of vertical as opposed to horizontal changes in the allocation of resources. This means less danger of changes here which are inappropriate or cannot be maintained. It may well be that this argument requires a lengthier statement than it received in the article or than I can give it here. But Mr. Hoffman is hardly entitled to describe it as "unnecessary," and he cannot dispose of it by reasserting a set of definitions which simply ignores the distinction I am making.

(5) We are at cross purposes over my references to the Banking School, evidently because we interpret these writers differently. It is not necessary to pursue this matter here, however, since the references were only incidental to my argument.

Professor Haberler on the Trade Cycle¹

Mr. Loveday explains in a preface that this book, which had its origin in a resolution of the Assembly of the League of Nations, attempts to co-ordinate the analytical work being done on the problem of the recurrence of periods of economic depression. Professor Haberler has divided the book into two parts, the first being a systematic analysis of existing theories, and the second an attempt to weave those theories into a general synthesis.

The first part is a brilliant achievement, a lucid and concise survey of theories of multifarious variety and some of them of great complexity, illuminated by occasional well-directed criticisms.

The second part, containing the synthesis, and setting out Professor Haberler's own solution, is also able and interesting, but if only it could have been included, on the footing of an artist's self-portrait, in the first part, duly classified and criticised, its author might have reconsidered it in some respects.

When he starts by showing that an economic system is "liable to cumulative self-reinforcing processes of expansion and contraction," he is on firm ground; this part of the theory commands general acceptance. The cumulative character of expansion or contraction he explains as due to monetary causes. An indispensable condition of the expansion is that the total demand for goods in terms of money per unit of time must expand (p. 191). There results increased productive activity, and the additional earnings give rise to an increased demand for consumers' goods. "Idle monetary funds are set in motion and the demand for all kinds of goods is further increased, which generates income" (pp. 187-8).

When Professor Haberler turns to the monetary analysis of this process, he uses the term inflation to mean an increase in the total demand for goods, and he treats saving *plus* inflation as constituting the "supply of investible funds." He thereby implicitly excludes the possibility of an additional supply of money being employed for any other purpose than "investment." What does he mean by "investment"? "Gross investment is, roughly the same as production of producers' goods, the only difference being production of consumers' goods which are not consumed but stored up in the

¹ *Prosperity and Depression*. By G. von Haberler. Allen & Unwin. 1937. xv. + 363 pp. 7s. 6d.

shape of stocks, or of durable consumers' goods (motor cars, houses); but the latter are better regarded as producers' goods producing consumable services" (p. 194). Gross investment includes replacement as well as net investment, and Professor Haberler elects to interpret investment as gross investment.

But *all* consumers' goods (except direct services) are stored up for some time, long or short. Does it not follow that investment (being "gross") includes the entire output of material products, of which far the greater part is consumers' goods? The question is not merely a verbal one. Professor Haberler takes for granted throughout his analysis that investible funds are applied to the production of fixed capital, and he often treats producers' goods and capital goods as identical. It would follow that an increase or decrease of the flow of money, which constitutes the demand for goods, can only be brought about through the long-term investment market. We find a passing reference to "the distinction between long- and short-term credit—that is between the capital and money market" (p. 218), but very little recognition of the function of short-term borrowing as a means of financing working capital. Once it is realised that the regulation of short-term credit affects the whole range of consumption-goods industries as well as the limited field of capital-goods industries, and that the response of working capital to this regulation is very much more prompt than that of the production of fixed capital, the entire aspect of monetary policy is changed.

In another respect Professor Haberler's monetary analysis is defective. As a measure of the total demand for goods he takes the expression MV , where M is the quantity of money and V the "trade velocity, the term being understood to cover all transactions which involve an exchange of goods in all stages of production, but to exclude financial transactions (e.g. on the Stock Exchange)" (p. 57).

Now MV so defined includes all purchases of goods by one trader from another. But such purchases, whether for the purpose of use as materials in manufacture or for simple resale, do not take the goods off the market. The goods continue to be offered for sale. The kind of demand upon which economic activity depends is the demand of the final purchaser, the purchaser of consumable goods for consumption or of instrumental goods for use. Account has also to be taken of any designed net increase or decrease in traders' stocks, but that is a matter on which MV throws no light. If MV serves Professor Haberler's purpose at all, that is only because it does tend broadly to move in proportion to the final purchasers' demand. But it can by no means be relied on to do so exactly. Of the elements of cost and profit that make up the final selling price of a commodity, each is counted as many times as it changes hands. If the sale of a cotton garment to the consumer is the last of ten stages, the value of the raw cotton is counted ten times, of the yarn nine times, of the weaving eight times and so on, while the retailer's profit is counted

only once. If there were a rise in the price of raw cotton, it might well be that MV would increase even if the value of cotton goods sold to consumers decreased.

The final purchasers' demand is closely related to the consumers' income and outlay and the operations of the investment market. But MV has no such relation, and a monetary analysis based on it is therefore essentially incomplete.

The most fundamental part of Professor Haberler's synthesis is his theory that the "down-turn" in the trade cycle is due to maladjustments generated by the process of expansion itself. These maladjustments he traces mainly to what he calls the "acceleration principle," that is to say, the tendency of new investment in any industry to be proportional to the *rate of increase* of the demand for the product of the industry. If there is a rapid expansion of output by industry generally, then, he argues, there will be a corresponding pressure to extend capacity in many or all industries; and, when full employment is reached, there will no longer be room for any further increase of output, and new investment will die down.

But it is not to be supposed that funds will invariably be forthcoming for whatever volume of new investment the prospects of industry may suggest. The resources of the investment market are limited. Savings can be supplemented, it is true, by the creation of credit or "inflation" (pp. 195-9), and, when industry becomes especially active and profitable, there will undoubtedly be some increase in borrowing (direct and indirect) for capital outlay. But under any conceivable credit policy it will be the function of the banks to keep such borrowing within limits. And the prudence of borrowers is also a restraining influence in the great majority of cases.

It is the function of the investment market to keep new capital flotations within the available resources, and it usually discharges that function with reasonable efficiency. When there is a great spurt in the projects of industry for the raising of capital, the investment market puts the brake on; by the application of various deterrents it procures the postponement or abandonment of a proportion of these projects. The result is an accumulation of arrears of capital outlay to be undertaken as soon as the market is favourable.

Moreover the idea that the pressure for new capital outlay will be greatest at the time when the expansion of output is greatest is fallacious. The "unusually rapid expansion all along the line," we are told, "is made possible by the existence of unused resources which are gradually drawn into employment" (p. 264). But the "unused resources" will include idle plant as well as unemployed labour, as Professor Haberler indicates in an earlier passage (p. 207). It is only when the expansion of output is reaching capacity in some industries that the pressure for capital outlay to extend capacity begins.

When the *préssure* does come, it is probable that the demands for the extension of capacity of existing industries will be given the preference by the investment market over those for the introduction of new industries and new processes. The result will be the accumulation of arrears of projects of the latter type, so that the effects of the pressure will continue for some time after the extension of capacity is completed.

And, even apart from this accumulation of arrears, the pressure will not cease merely because industry is fully employed. It will be diverted to projects for increasing output with a given man-power. So long as the monetary expansion continues, these projects will be abnormally profitable. If when or after full employment is attained the monetary expansion ceases, so that projects for capital outlay no longer seem abnormally profitable, there is still no reason why sufficient projects should not be forthcoming to use up current savings. The inflationary supplement to current savings will have ceased, but in any case we are supposing all monetary expansion in excess of normal growth to cease. This inflationary supplement to savings is a source not only of additional capital outlay, but also of an excess consumption met from stocks of goods, which is a contributory cause of the activity of the producers of consumable goods and the rise of prices of those goods. If the rise of prices is to cease the inflationary supplement must cease.

But when inflation is eliminated, prices stabilised and profits reduced to normal, there is no reason why there should not be a normal flow of capital outlay adjusted by the investment market to the normal flow of savings, even after the arrears of projects have been worked through. That there is ever a shortage of projects for capital outlay under such conditions there is no evidence at all. Professor Haberler's synthesis is purely theoretical with no reference to practical experience.

Professor Haberler does not exclude the possibility of a reversal of the expansion arising from monetary causes (pp. 247-9), and if he rejects any such explanation, except as an accidental intervention, it is because he believes in the "maladjustments" as being more fundamental. If his argument for the maladjustments is vitiated, it would seem that only the monetary causes remain.

In any case his explanation of the self-reinforcing character of expansion and contraction is monetary, and he frequently invokes an "elasticity of the supply of money," or of credit, or of investible funds, as a necessary condition of various processes both in his criticisms and in his synthesis.

What does he mean by "elasticity of supply" in this connection? The sources of supply (p. 200) are (1) the banks and (2) liquid reserves of purchasing power (hoards) in the hands of business firms and individuals. So far as banks are concerned elasticity depends on "how far the banks are willing at any given moment to vary the

supply of investible funds in the face of variations in demand and in the rate of interest which they can obtain." In the case of hoards "the higher the rate of interest the greater the temptation to dis-hoard." Apparently therefore elasticity means elasticity with reference to the rate of interest.

Parenthetically it may be pointed out that this is a flagrant case of confusion between long-term and short-term rates of interest. Professor Haberler, following too many contemporary economists, takes "hoards" to mean liquid resources, which usually earn interest, so that a rise in the short-term rate of interest is an inducement to increase them rather than to diminish them. That however is a side issue.

This expression, elasticity of supply of money, represents all that Professor Haberler takes into account of monetary policy. And how utterly inadequate it is! "Elasticity" tells us nothing; it is merely a device for describing the behaviour of anything in relation to its price in terms of the differential calculus. It is only applicable to a function of one variable. But the supply of money is not a function merely of the rate of interest; it is determined by human volition and usually in the light of a wide variety of considerations. The short-term rate of interest is itself deliberately varied with a view to regulating the flow of money. Professor Haberler recognises over and over again the essentially monetary character of the trade cycle. Yet the manner in which the authorities responsible for regulating the flow of money act is excluded from his synthesis except through this hollow phrase, elasticity of supply.

R. G. HAWTREY.

Book Reviews

International Control in the Non-Ferrous Metals. By W. Y. ELLIOTT, ELIZABETH S. MAY, G. W. F. ROWE, ALEX SPELTON and DONALD H. WALLACE. The Macmillan Company, New York. 1937. 778 pp. 28s.

In this impressive volume Mr. Elliott and his collaborators provide a mass of valuable information about the non-ferrous metals (together with numerous statistical tables and graphs), with special reference to the history and results of international restriction schemes. In addition, interesting though highly controversial chapters have been written by Mr. Elliott on the political aspect, and by Mr. Rowe on the economic aspect. No one interested in the production and trade in the non-ferrous metals, and in schemes of international control of commodities in general, can afford to miss this informative volume.

The advantages of co-operative research are shown by the fact that each metal has been treated by an expert possessing intimate knowledge not only of the technology of production and utilisation of the metal, but also of the organisation and financial "set-up" of the companies and groups of interests concerned, of the national and international negotiations resulting in restriction agreements, and of the actual machinery of control.

Nevertheless it must be admitted that the work as a whole is disappointing. In the first place, the statistics are presented throughout with a minimum of explanation and criticism, whilst even the mass of statistical information provided fails to give all that is needed for judging the results of restriction on prices. No one who has sought for complete and reliable figures of production, trade and consumption for these metals, and who has compared the figures given by the various authorities, can fail to be impressed by the incompleteness and variability of such data. Surely, therefore, even if the best authorities have actually been chosen, some critical discussion of the sources of the data, methods of estimation adopted where direct records are lacking, reasons for choosing certain authorities rather than others, and of the probable margin of error in certain cases, would have been in place? Incidentally, there is not only no list of statistical sources, but no bibliography whatever!

In judging the effects of restriction schemes on price, it is necessary to consider price fluctuations as well as average price-levels. Yet average monthly prices are all that are given. From them no idea can be gained of the frequency of price changes, nor of the extent

of price fluctuations. The reviewer expected to find diagrams illustrating the number and extent of price changes under competition and restriction respectively. But there is not even any clear indication as to whether or not restriction tended towards greater price stability.

In the second place, this work illustrates the disadvantages of co-operative research: in particular the difficulties of co-ordination, and of interpretation by one expert of material presented by others. The danger has not been avoided that the experts providing detailed information may fail to present, or to present in usable form, all that is needed if the full implications of the facts analysed are to become apparent. The experts on particular metals were interested in certain aspects of their subjects, and these they present fully and authoritatively. They were not, however, equally interested in other aspects, although the latter are essential for full economic interpretation. For instance, the price of a metal obviously depends upon internal (national) as well as upon international factors. It can hardly be denied that monopoly elements of one type or another have played a large part in the determination of the price of the non-ferrous metals in the U.S.A., and this has necessarily affected the world price, especially when the United States was a net exporter. Yet nothing whatever is said about the machinery of price determination in the U.S.A. The basing-point system—which is known to have prevailed over long periods in the copper, lead and other non-ferrous metal industries—is not even mentioned. Again, nothing is said about the agitation in the United States for the establishment in New York of an Exchange (or Exchanges) corresponding to the London Metal Exchange. Yet it has been widely held that American consumers were injured by the absence of such machinery, and by dependence upon either the London Market or the powerful production groups.

It can only be concluded that a valuable opportunity has been lost, through a failure to secure adequate co-operation. Despite the mass of facts and figures, the subject has not been treated, still less interpreted, "in the round." Certain aspects only have been fully analysed; comparisons and correlations have been neglected. Merely by omitting repetitions (such as are necessarily involved by the separate sections on the U.S.A. for copper, lead and zinc) and by presenting combined instead of separate diagrams for the various metals (for certain purposes) much could have been done without even enlarging the work.

These shortcomings must be attributed not so much to the individuals concerned as to the method pursued: i.e. to the lack of preliminary agreement as to what facts and figures should be collected, and as to how they could best be presented so as to illustrate the effects of restriction, and to institute comparisons and contrasts between the various metals, and between competitive and restrictive conditions,

It is impossible in a short review to deal individually with the many and varied topics discussed in this large work. I will, therefore, confine myself to a short comment upon Mr. Elliott's political interpretation, and to more detailed consideration of Mr. Rowe's "general economic aspects" (Chapter III).

After concluding that (a) State policies have been primarily concerned to safeguard producers' profits, and no attempts have been made to deprive foreign countries of finished metal, and that (b) the metal industry remains international, despite the adaptation of international cartels to national divisions, Mr. Elliott concludes that it is imperative for international capitalism to develop a technique of international control strong enough to oppose purely national and political interference in order to conserve wasting resources and to protect consumers from exploitation. One may sympathise with this desire, but in the face of the overwhelming evidence presented in subsequent chapters that in the past international control schemes have been based fundamentally upon national policies, and that they have signally failed to protect consumers from exploitation, it is difficult to see why Mr. Elliott should expect quite different results in the future. Moreover, his final paragraph appears to be a complete *non sequitur*. He apparently attributes the danger of war largely to the lack of access to raw materials; "the only conceivable alternative to a catastrophic series of imperialistic wars is an opening up of the vital raw materials of the world to all nations." Yet, as already noted, he himself has admitted that no attempts have been made to deprive consuming nations of the materials under consideration—a conclusion fully borne out by the recent flood of literature on the subject—whilst subsequent chapters are overwhelmingly concerned with problems arising not out of the scarcity of raw materials, nor of rivalry for securing them, but out of over-capacity and a non-remunerative level of prices.

Mr. Rowe starts by delimiting the objects of his chapter. These are (a) to trace the evolution of the artificial control schemes in the four chief non-ferrous metal industries—he excludes consideration of the nickel and aluminium industries because in them ownership of capital is so highly concentrated that competition is out of the question; (b) to analyse the merits and demerits of these schemes in comparison with *laissez-faire*; (c) in the light of this analysis to determine the proper economic usage of such schemes, the broad lines of policy according to which they should be conducted, and the rôle of Governments in relation to them; and (d) to estimate the probable trend of international organisation along such lines. Before entering upon this task, he himself suggests that comprehensive treatment of the problem of international control in these four metals really involves a study of international control of production in general. It may be conceded that such comprehensive treatment can hardly be expected in a specialised study. Nevertheless some short summary

of the assumptions upon which his conclusions are based might have been expected, especially as, in spite, apparently, of a theoretical bias in favour of *laissez-faire*, he concludes finally that the continuance of international control is desirable. Moreover, even if comprehensive treatment of international control of production would be out of place, it does not follow that a discussion of the factors affecting the production and price of the non-ferrous metals within national boundaries should also be excluded. But here, as throughout the whole work, this subject is conspicuous by its absence.

The weakest part of Mr. Rowe's argument falls under heading (b). It is, indeed, difficult to understand Mr. Rowe's attitude on this fundamental subject. No criterion is suggested by which the relative merits of restriction and competition can be judged. In his chapter on copper Mr. Skelton states that in a capitalist (not, be it noted, a competitive) society, "the policy which gives the producer the greatest profits—in the long run—must be accepted as the most advantageous to society" (p. 438). Mr. Rowe does not say whether or not he accepts this criterion, but he provides no alternative. Such a statement calls for a great deal of explanation, which it does not receive from either Mr. Skelton or Mr. Rowe, before it can be accepted—if, indeed, it can be accepted in any sense. For instance, one may ask, what producers are to be included? Existing producers, or potential producers? The continuance of international control might well lead to the greatest profits for existing producers, but if national and international control were entirely removed and free play were given to competitive forces, who is to say that the profits of surviving and new low-cost producers would not, in the long run (and how long a run is to be considered?), be greater than those of existing producers under restriction? In fact, the proposed criterion seems to be merely that by which existing producers would be guided, if they understood their own interests: there is no reason to assume that it would benefit society as a whole, unless it is assumed that free competition prevails. But nothing is said about the presence or absence of competition. Is the undoubted existence of monopoly elements within the various national boundaries irrelevant? How can the results of possible policies be compared, if one type of policy—that which would prevail under competitive conditions—is excluded from consideration?

What Mr. Rowe asks is whether restriction is, or can be, an improvement over *laissez-faire* in securing a nearer and more continuous approach to normal equilibrium. But no attempt is made to define "normal equilibrium." Is this the same as "the competitive equilibrium"? If so, it is surely a contradiction in terms to suggest that restriction and price-maintenance (even if confined to the depth of the depression, as advocated by Mr. Rowe) can lead to "normal equilibrium". If the latter phrase has another meaning, it should be clearly defined, and it should be shown in what ways such an

equilibrium would be superior to the competitive equilibrium. It is possible that Mr. Rowe equates "normal equilibrium" with "price stability." But if so it remains to be shown (a) that restriction does or can secure greater price stability than competition; and (b) that greater price stability is desirable. For instance, the argument would have to be met that stability of the prices of particular goods tends to hinder adjustment and aggravates the trade cycle.

The possibility of and the means of attaining the "competitive equilibrium" are what should have been more fully discussed. This leads us to consider Mr. Rowe's views on the rôle of Governments in control schemes. He considers only the rôle of Governments in supporting restrictions. Why does he not also consider the possible rôle of Governments in maintaining, or reintroducing, competitive conditions? It is true that in the past (notably in the U.S.A.) efforts to insist upon competition have failed. But it has been maintained (for instance in Professor Fetter's *Masquerade of Monopoly*) that it would not be impossible, nor even very difficult, to devise measures which would guarantee free play to competitive factors. Whether or not Mr. Rowe agrees with Professor Fetter on this point, the question deserves discussion. This brings us back again to the impossibility of separating national from international factors and policies. If national policies were overhauled, the conditions which at present seem to necessitate international regulation might cease to exist, or at least their importance would be greatly diminished. It is the protection of invested capital and of high-cost producers by national policy which leads to international agreements with the same object. In fact, it must be admitted that Mr. Rowe advances no adequate reasons for the superiority of control over competition from the point of view of society as a whole, whilst his acute criticisms of the actual policies pursued under the various international control schemes tend to the conclusion that in practice control is likely to be exercised in a highly detrimental manner. Indeed, it is with a severe shock that we read of his conversion to the opinion that control is inevitable and desirable.

On the other hand, it must be admitted that, if control is inevitable, his arguments in favour of a particular type of policy—namely, that price maintenance should be practised during the depths of depression, but that output and price should be freed directly there are signs of general trade revival—carry great weight. He makes out a clear case for preferring such a policy to those actually pursued under the various restriction schemes, although he suggests that it is unlikely to be adopted. One is driven to the conclusion that his support of international control is based on the inadequate ground that in fact restriction is likely to be continued. A more logical attitude would have been to condemn restriction, but to point out that if it is continued the policy outlined above would be that which would do least

harm, and that, indeed, it would solve certain problems which cannot be solved by the policies so far adopted.

In conclusion, I should like to draw attention to the plea advanced in another connection by Dr. Benham (*ECONOMICA*, November, 1937, p. 472) for more discussion of the foundations and effects of monopoly power, as distinct from the theory of monopoly price. Not until this has been done will it be possible to compare adequately the results of free competition or of control, and to decide whether or not measures could be introduced which would prevent the development of monopolies. Could Governments insist upon conditions and institutions which would give free play to competitive forces? Can we choose between free competition and planning? Can we plan to compete? Advocates of *laissez-faire* will, in my opinion, only regain the public ear if or when they demonstrate the existence of this choice. If they perform this task, I expect Mr. Rowe to be numbered amongst the first adherents of "the new competition."

VERA ANSTEY.

A Survey of the Social Structure of England and Wales, as illustrated by Statistics. By A. M. CARR-SAUNDERS and D. CARADOG JONES. Oxford University Press. 1937. xviii + 235 pp. 10s.

This is the second edition of the well-known work, which was reviewed in *ECONOMICA* in 1928. It is mainly a straightforward revision, in which the results of the Population Census of 1931, and of other recent enquiries are incorporated, with comparative figures where they are appropriate. It is curious that the second edition has fewer pages than the first, though there is no alteration in the Chapter headings, and a great part of the letterpress is unchanged. Almost the only new material is that derived from the New Survey of London Life and Labour, Merseyside and other Surveys. This suggests that in the past ten years very little has been added, officially or otherwise, to our knowledge of the measurable aspects of social relations and conditions, though a closer study of the book will show that some of the newer figures are more detailed and better analysed than the earlier. The lacunæ thus revealed may be commended to the consideration of Organisations for Research.

Among these wants are studies of the distribution of income between individuals and families, investigation of savings, of allotment of resources to different purposes, and of the internal structure of the family in relation to age and earning strength. In the last respect the Census is seriously deficient, since there are no tabulations of families except in relation to housing, though much material exists in the householders' schedules, some of which has been unofficially used. But our authors might have devoted some space to the rather copious material on this subject to be found in the various local Surveys. Most of the statistics are clearly and precisely presented,

with a wise discrimination between what is ascertained and what is guessed. In the occupation and industries Chapters there is room for a more definite analysis of employment by Public Authorities which are partly administrative and partly productive. On the one side some interest attaches to the question how many are employed on a semi-socialistic basis by Governmental and Statutory bodies, not working for profit or limited in their profits, on the other how many of these are in fact employed in industry or transport; the analysis on this subject on pages 55-6 might have with advantage been extended. On page 61 we read "We should like to have, but cannot get, figures showing the numbers of groups of employees of various sizes"; but in fact the Census of Production of 1930 gives a great deal of information on this subject.

It is surprising to find in the new edition the repetition of a slip on page 1 of the first. We are told in a footnote that 13,334 gives the nearest thousand to 13,334,537! It may be hoped that the 1941 Census will be rather more promptly issued than has been the custom, and that this may be corrected in the edition that will be needed in a few years' time.

This revised edition is as useful as was the first to all teachers, students and investigators, who need a convenient and accurate introduction to social statistics. It is only to be hoped that it will be realised that it is only a summary, and that reference to the originals is necessary for all detailed and serious work.

A. L. BOWLEY.

The Chicago Credit Market: Organisation and Institutional Structure.

By MELCHIOR PAYLI. Directed by the Social Science Research Committee of the University of Chicago. Number XXXIII. University of Chicago Press. 1937. xvi + 448 pp. \$4.00.

The worst feature of this book is its title. That does, indeed, faithfully convey both the aims and the scope of the work; but, inevitably, it also suggests that Mr. Payli's material will concern only the most specialised of banking students. And that is very far from the truth. This detailed analysis of the banking "set-up" of a given area—one roughly corresponding to that of the Seventh Federal Reserve District—creates a perspective of the American banking scene which cannot be achieved solely by a survey of the banking system as a whole. Mr. Payli, moreover, never loses his sense of proportion: at all points he presents the Chicago market in its wider setting, and for comparison and contrast draws freely upon an extensive knowledge of European systems and markets.

The book is not, however, complete in itself. It does not discuss the internal functioning of the system, and so does not deal with credit policies; these are to be examined in a second volume. The present work deals solely with the structure of the system, though

the statistical appendices (the 170 pages of which contain a wealth of new material for the research student) are designed to provide for both purposes. They should certainly prove adequate, for, together with Mr. Payli's descriptive analysis, they present a highly detailed account of the banking and financial mechanism of the area.

Chicago, it is not usually recognised, is, in point of volume of deposits, the third money market in the world, and yet is a market of little international importance, with an incomplete technical short-loan equipment and an under-developed capital market in the ordinary sense of the term. Mr. Payli naturally finds the explanation of this paradox in the special position of New York, yet shows conclusively that in many vital respects Chicago has not been subordinated to the financial capital. It is, indeed, more nearly independent than any other local financial centre in the world, holding by far the greater part of the reserve balances of the hundreds of banks within its area, while its big banks—one-quarter of whose deposits are derived from other banks—perform more of the characteristic central banking functions than does the local Reserve Bank itself. Its area embraces very few of the typical savings institutions (until 1929 there was not even a single fixed or management trust in the City); its Stock Exchanges are of very limited scope and are dominated by New York; and its issuing machinery is quite unimportant. Yet its banks have remained independent, and it has become the centre for the distribution of securities throughout the Middle West, with a huge and complex organisation for the purpose. Here are further paradoxes which only a searching analysis such as Mr. Payli's can explain away. In doing so, he sheds much fresh light upon a wide range of banking problems, and especially upon the unit banking controversy—for it is the American bank correspondent system (which alone makes unit banking practicable) which, more than anything else, has contributed to the power and size of the Chicago Credit Market.

W. T. C. KING.

Linear Regression Analysis of Economic Time Series. By T. KOOPMANS.
Netherlands Economic Institute, Publication No. 20. 1937.
150 pp. 2 florins.

There are three problems in the analysis of time series by the methods of linear regression—the selection of the variables to be related, the estimation of the co-efficients in the linear relation assumed between the variables and the description of the significance of the estimates. Dr. Koopmans makes a very important contribution to the solution of the second and particularly of the third of these problems. He considers the problems as belonging to the field of sampling theory, “errors” arising in all the variables related. He combines the approach of Professor Ragnar Frisch with that of Professor R. A. Fisher; following the former, he takes each variable

as the sum of a "systematic component" (satisfying the regression equation exactly) and an "erratic component"; following the latter, he assumes that each erratic component has a definite probability distribution. Hence, in assessing the significance of the estimated regression co-efficients, he allows for two kinds of error, an error due to sampling and an error due to our ignorance of the variances of the erratic components of the different variables. Not everyone may accept Dr. Koopmans' "sampling" approach and his theory is still severely limited in many ways; but it can scarcely be denied that our knowledge has been advanced and that a flood of light has been thrown on parts of the problem we have previously seen very hazily. A word of warning should be added. Dr. Koopmans' exposition is couched in terms so severely mathematical as to be beyond the comprehension of the average economist interested in the application of statistical methods. To be able to follow the treatment in detail, the reader needs a working knowledge of matrices and determinants, quadratic forms and linear substitutions, and a more than passing acquaintance with the work of Professors Fisher and Frisch. The book is to be strongly commended—to those with the necessary mathematical equipment and to those with mathematical friends willing to translate parts of the treatment into simpler language.

R. G. D. ALLEN.

Prices in Recession and Recovery. By FREDERICK C. MILLS. National Bureau of Economic Research, New York. 1936. xv + 581 pp. 16s.

We are much indebted to Dr. Mills for the full-length and illuminating account of the changing price structure in the U.S.A. during the eventful period, 1929-36. The movements of wholesale price series, and of such series of retail prices as are available, are fully analysed and related to other relevant economic material. The period of recession and recovery is viewed in the light of pre-depression developments and of the shifting price structure in the world at large. The main emphasis is firstly on the changing fortunes of primary producers and secondly on manufacturing industry and fabricational margins. Capital equipment and consumers' goods are dealt with more lightly, distributional margins not at all. Considerable skill and ingenuity is shown in the manipulation of the series of price index-numbers utilised. Taking one small example, we can note how Dr. Mills views his problems in their different aspects by taking the index-numbers with alternative bases (1913, 1929 and 1933)—a striking illustration of the effect of changing the base of an index-number. It may be that some readers will find the method of treatment somewhat unsatisfactory. Those who prefer a concise and closely worded argument will consider that Dr. Mills' account is extended to the point of repetition. Those who find a statistical treatment more

easily followed when it is presented in graphical form will regret that this method is little utilised in the present volume. Further, many readers will look first for an estimate of the effect of the A.A.A. and other New Deal legislation on the price structure in the U.S.A. only to find the author particularly cautious and reticent on this point. But all will agree that the book, apart from some defects, is a substantial and illuminating piece of work.

R. G. D. ALLEN.

Industrial Assurance. By Sir ARNOLD WILSON, M.P., and Professor HERMANN LEVY. Oxford University Press. 1937. xxxiii + 519 pp. 21s.

The sub-title to this important book is "An Historical and Critical Study." Without in any way disparaging the very valuable historical section with which it opens, it is on the second adjective that the chief emphasis must be laid. Yet the criticism is so well documented and, so far as can be judged in the absence of counsel for the defence, so fairly argued, that the book will be of value, not merely to social reformers, but also to students who wish to examine dispassionately the working of one of the most important and least studied of modern British institutions. The chief defects from the point of view of such a reader are, firstly, some tendency on the part of the authors to quote with apparent approval views which elsewhere in the book are shown to contain fallacies (compare, for instance, page 196 with pages 217-218), and, secondly, the absence of a statistical appendix giving in full the many partial statistics which are quoted in the text.

The aspect of Industrial Assurance upon which the authors' criticism is principally concentrated is the high pressure salesmanship with which an army of agents forces upon an ignorant clientele a commodity so easy to misunderstand and so difficult to value as life insurance. The pressure of the agents on the public is in turn largely due to the pressure of the companies and societies on the agents to secure an ever-increasing premium income. Even those agents who are paid by salary and not by commission depend for their promotion, and even for the retention of their positions, upon showing a continual increase in the premiums they collect, while where the results obtained by the regular agents are deemed inadequate, special canvassers are sent down to liven up the rate of growth.

To the intensity of this selling pressure on the public the authors attribute many evils. Industrial life insurance is used mainly for the purpose of providing for expenses incurred in connection with funerals, and even at best the agents' pressure for increase tends to exaggerate the existing tendency of poor people to spend on funerals sums altogether out of proportion to their incomes. Secondly, it leads to the abuse of the special industrial "life of another" policies,

which are permitted by law in order to enable people to insure against the expenses which they may have to incur for the funerals of close relatives, but which are often taken out by persons whose risk of liability is very slight and therefore tend to become mere gambling policies. Thirdly, and worse, it leads to very large early lapses of policies, equal to nearly half the new policies taken out. Even where surrender values or free policies are granted, the heavy preliminary expenses cause the greater part of the premiums paid on short-lived policies to become a dead loss to the insured. Fourthly, the pressure on agents sometimes drives them into procuring the issue of illegal policies, swindling the public out of part of the benefits due, and other malpractices, despite the efforts of the offices to check these abuses. And finally, the cost of this intensive selling is high, and the ratio of expenses to premium income ranges from 26.6 per cent. in the case of the largest company to well over 40 per cent. for some Collecting Societies. Altogether, the authors claim that the practice of industrial insurance, as at present conducted in this country, leads to widespread misdirection of the resources of the poor and frequently to the loss of amounts which they can ill afford.

In the last section of the book, the authors examine various suggestions which have been made for the improvement of the system. They do not think that it can safely be left to improve itself under stress of competition. They recognise that the system of paying agents by salary instead of by commission and of allocating to each agent his own limited area has led to a great reduction in the costs of the largest companies (which after all now compare not unfavourably with those of most retailing institutions), and to a consequent increase in benefits. They also admit that the high-cost companies and societies are being compelled to reduce their costs and increase their benefits in order to remain in business. But they consider that the improvement so obtained is at the expense of an increase in the other evils which they attribute to the pressure due ultimately to competition. Nor do they think that additional legal safeguards, as proposed by the Cohen Commission, can do more than palliate some defects, while others may be actually made worse by further additions to the already complicated mass of legislation. They do not consider that a reconstituted scheme of voluntary insurance through the Post Office, even though offering much better terms, would be successful in competition with high-pressure canvassing; and they do not support the proposal for a partially voluntary scheme of funeral benefits conducted through the unemployment exchanges which was put forward by Mr. J. L. Cohen.

The suggestion which they themselves make, in the last chapter of the book, is that funeral benefits should become an integral part of the existing Health Insurance Scheme, and that contributions should therefore become compulsory. It is unfortunate that this proposal is dealt with so briefly, for there appear to be many difficulties,

of principle as well as of practice, which the authors discuss either inadequately or not at all. The most important of these is not the immense practical difficulty of the transfer to the State of the assets and business of the industrial insurance offices and of the compensation of the vested interests of shareholders and agents. To these questions the authors give some attention, though they leave the problem of their solution to a hypothetical Royal Commission. To the even more important question of the basic principle involved in the introduction of compulsion they give no space at all. Yet this is surely the central problem. The authors emphasise that people's reluctance to pay contributions is such that they need terrific pressure to induce them to do so, and that a voluntary scheme would be a failure. Yet they propose to deny to the people even that amount of choice that selling pressure leaves them, and to force them to pay contributions whether they feel they can afford them or not. To say that compulsion is cheaper than persuasion is beside the point. To abolish all political parties save one and to make voting for that one compulsory would undoubtedly bring an enormous reduction in election expenses. Nevertheless this country at least continues to think that the higher cost of persuasion is worth while. To abolish the freedom of the consumer to choose what and how much and from whom he will buy will often reduce the cost—to those who would in any case have chosen to buy what is made compulsory. But their benefit is obtained at the expense of those who can no longer get what they want. If a subsidy to the first class is wanted, are the second class the right people to pay for it?

It may be claimed that if employers are made to share the burden of the contributions, the cost to the beneficiaries may be so reduced that few of them would grudge their own share of the contributions. Even if this is true, it does not mean that the scheme is desirable. In this case benefits are subsidised by a further tax on wage bills, which, if it is not passed back to the workers, must tend to reduce employment. Is this the best way of raising the amount required for the subsidy?

A similar difficulty arises in regard to a suggestion which the authors seem to make in a somewhat ambiguous paragraph (p. 490). They say "premiums and benefits might be graduated according to social needs, on lines which would take into account the family income, the number of children and other dependents, the regularity or otherwise of employment, and the status of the insured person." This might mean merely that both the contributions and the benefits should vary with the economic position of the contributor. But this flexibility is provided by the present system, and the fact that the authors have in mind an advantage peculiar to compulsory State insurance makes it likely that it means that contributions but not benefits should be varied, or that benefits might vary inversely with contributions. This would mean a subsidy to some members of the

industrial class at the expense of other members of the same class. Are these the right people to pay it?

The answer to these doubts is surely that, if the country decides that benefits should be subsidised at all, the sums required should be taken, not from any arbitrarily penalised section of the public, but from the national exchequer. If Parliament wishes to put an end to many of the difficulties which are said to arise from the present methods of providing funeral benefit, would not the simplest and most effective way be to abolish the abhorred "Parish Funeral" and in its place to offer to all citizens, at the State's expense, a decent and dignified ceremony? Half a million State burials a year at £15 each would cost £7,500,000. At this comparatively small annual cost, industrial insurance agents would be deprived of their strongest argument, the much-abused "life-of-another" policies could be abolished, and the people of Britain would be set permanently free from the fear of a dishonoured grave.

F. W. PAISH.

A Study of the Capital Market of Post-War Britain. By A. T. K. GRANT. Macmillan, London. 1937. xx + 320 pp. 8s. 6d.

This book will help to fill a serious gap in English economic literature. The author makes little attempt to break new ground, but in his descriptive sections he provides a very useful summary of much of the available information about the capital markets of this country since the war, and of the effects on them of Government finance and monetary policy. The chapter which contains the most fresh information is that which deals with the financing of the "fringes of enterprise," where the author deals with the difficulties of obtaining finance for new and small firms and for new inventions. He appears to support the proposal for the creation of one or more large industrial banks, acting in close co-operation with the existing banking system, which would specialise in the financing of new and small concerns, taking up shares, sharing in the management, and floating them off as public companies as soon as they reached a stage when their profit records would justify such a step.

It is doubtful, however, if Mr. Grant has appreciated sufficiently the costs involved in investigating the multitude of propositions which would be rejected for each one found suitable, and in maintaining an organisation on the scale he suggests. The earning prospects of a small business depend largely upon the personal qualities of its owner, and the persons able to finance it most cheaply are therefore those who already have the advantage of an intimate personal knowledge of his character and ability. Mr. Grant hardly makes good his case against the presumption that the existing methods of

privately financing small businesses persist in this country because they are still in fact the cheapest.

The critical and analytical passages in the book are variable in quality. Mr. Grant's emphasis on the fact that published rates of interest refer only to rates available to eligible borrowers, and that a decrease in eligibility may well mean that effective rates of interest are going up at a time when nominal rates are going down, is both important and timely. On the other hand, in dealing with certain other points, notably the effects of a rise in short-term interest rates, the consequences of funding short-term Government debt, and the purposes of liquidity in bank advances, his argument is not sufficiently penetrating and precise to carry conviction. A perhaps extreme example of doubtful argument occurs in the course of his discussion of the first of these points. He is seeking to show that the effect on business activity of a rise in short-term interest rates is through its repercussions on the market for long-term capital, when on page 29 he says: "The one thing which is inflexible in the short run is the amount of working capital required by the community: this depends directly on the rate at which goods are being taken up by the final consumer in the case of consumption goods and by the final owner in the case of new capital goods. Money can only be withdrawn from the bill market on condition that somehow or other it is replaced or alternative facilities are available elsewhere."

At first sight it is uncertain whether the author means that in the short run working capital fluctuates directly or inversely with sales to the consumer or ultimate owner; but from the accompanying footnote (p. 30) it seems clear that he means that the relationship is direct. This may be true in the *long* run, when the producer has had time to adjust his output or purchases to the change in demand, but in the *short* run, which is what we are exclusively concerned with here, the opposite is true. The impact effect of an expansion in sales is an excess of money income over expenditure, a fall in stocks, and a reduction in the amount of working capital needed by the business, while a fall in sales means a temporary piling-up of stocks and an increase in the finance required to carry them. A firm pressed for working capital has two possible ways of remedying the position, besides obtaining finance from an unwonted source. It can cut its selling prices and increase its sales, or it can curtail its output and purchases. Action by many firms along one or other of these lines will bring about a reduction in the community's need for working capital by means of a fall either in output, or in prices, or in both. The secondary effects *via* the long-term capital market are no doubt often important, but they are not essential to the result, and one would normally expect them to make their appearance at a slightly later stage.

F. W. PAISH.

World Prices and the Building Industry. By J. F. WARREN and F. A. PEARSON. John Wiley & Sons, Inc., New York. Chapman & Hall, Ltd. 1937. v + 240 pp. 17s. 6d.

It is not often that a book is published in English which gives the building industry even a secondary place in its title. Economists will, therefore, be interested in this book, written by the Professor of Agricultural Economics and Farm Management and the Professor of Prices and Statistics at Cornell University.

The book is divided into two parts. The first part compares, by means of index numbers, the prices of foods and certain raw materials with prices of manufactured commodities, the cost of living and farm and city wages. Then index numbers of prices of 40 basic commodities in currency and in gold are prepared for 14 important countries. From index numbers for nine of these countries an index is made of world prices of basic commodities in gold. The course of prices in each country since 1913 is then compared with the course of world prices. Similarly the fluctuations of prices of individual basic commodities in the United States are compared with movements of the world price index of basic commodities, sometimes for the post-war period and occasionally for over 100 years. Finally, an attempt is made to explain the fluctuations of world prices in gold in terms of production of gold and "demand for gold."

In this section the authors present an extensive array of statistics interspersed with short ventures into economic analysis. The latter are based entirely upon the concept of an equilibrium between supply and demand, but are very rudimentary and sometimes confused. The reader is confronted with such statements as "if prices in gold rise to the pre-war level, then the price level in any country will be as much above pre-war as its percentage increase in the price of gold." There is an implicit assumption throughout these chapters that there was an ideal "balance" between different prices and different countries in 1913 which should be maintained. One would have liked some justification for this and reasons why the price structure would not need readjustment in post-war years.

The second part is devoted to building activity and its relation to the trade cycle. First, the available indices of building activity and vacancies are set out for several countries. Unfortunately these statistics relate almost entirely to residential building, ranging from building permits to idle water meters. Building activity is then related with vacancies, railway traffic, steel output, mail order business, marriages, credit conditions, railway bankruptcies and other varied series. Finally, in the last two chapters an attempt is made to explain business variations. Building activity is given emphasis (many will think it excessive) as the mainspring of business activity—with food, clothing and automobiles as important secondary influences and general price movements acting to damp down or accentuate the fluctuations.

When they consider the building industry the writers indulge rather more in economic analysis, but the results are disappointing. Several important variables relevant to building activity, such as migration of population, rents and building costs, are either mentioned in passing or omitted entirely. For instance, the argument that building activity varies inversely with the long term rate of interest is dismissed in half a page, without considering the relation of other operating factors, such as rent and building costs.

The book is profusely illustrated with graphs, each bearing a useful explanation of its implications. Usually the graphs are adequate for their purpose, but one strains the eye when it gives prices of 18 foods separately for over 20 years on a graph one and a half inches by one inch, and another strains the imagination when it says "the peak is about two million miles above top."

More than once the authors indulge in broad generalisations which are put forward with little or no support other than a graph which might equally uphold a quite contrary view. One can only admire the industry of the authors in presenting such a huge mass of statistical material, yet one is left with the feeling that their analysis is too brief and superficial to be really satisfying.

H. W. ROBINSON.

Work and Wealth in a Modern Port. By P. Ford. Allen and Unwin. 1934. 223 pp. 10s. 6d.

Our knowledge of the incidence and causes of poverty in this country has been considerably extended in recent years. As a result of large-scale corporate research we have the New Survey of London Life and Labour and the Merseyside Survey; but these very achievements make it all the more necessary to have the picture completed by exploring social conditions in other towns of a different character. The book under review is an instructive example of what can be done even when there are no wealthy benefactors to provide a staff for field work and computation.

Dr. Ford based the central and most important part of his Survey of Southampton on three sources of information—the returns relating to the income of heads of families, a sample of working-class households and a detailed examination of the lowest income groups, the "depressed classes." There is also an account of other aspects of the life of the town, such as, population trends in the last half-century, the location of industries, the structure of the labour market, the problem of overcrowding and crime.

It was found that 12 per cent. of all families with dependent children were in grades with an income of less than 42 shillings per week, and 19 per cent. of the population were in classes with an earned income of four pounds or over per week. The mass interview made it possible to classify the streets of the town according to income

grades; and then the sample inquiry to ascertain the extent of poverty was limited to streets which were definitely working-class. A total of 559 families were investigated, the ratio being 1 in 46. The sample was carried out in November–December, 1931, and the fact that business conditions were then rapidly deteriorating undoubtedly left its mark on the results. Dr. Ford says with truth that “it is no loss to have a measurement of poverty in the depths of depression”; but it is unfortunate that the family income data relate to a period, 1928, which was much more prosperous than the end of 1931. This was due, however, to the difficult circumstances which handicapped the Survey.

One of the striking results was the high incidence of poverty: no less than 21 per cent. of the working-class families were found to be below the defined poverty line in 1931. Southampton compares unfavourably with Merseyside and the London Survey area, though some allowance must be made for the difference in the dates of the inquiries. By abandoning the assumption that all family income is pooled, Dr. Ford arrives at what he calls “potential poverty,” that is, cases where the income of the head of the household is not sufficient to maintain the family above the poverty line. 34 per cent. of the families were found to be “potentially” poor. It would also have been illuminating to discover how far savings on the one hand and supplementary incomes (apart from social service incomes) on the other accounts for the actual level of family incomes. We need particularly to know more about clubs, insurance and other forms of regular saving.

The value of Dr. Ford’s work is enhanced by the fact that, with certain modifications, the results are comparable with those of the big Surveys.

BRINLEY THOMAS.

Exchange Depreciation. By S. E. HARRIS. Oxford University Press. Harvard University Press. 1936. xxix + 516 pp. 21s.

This weighty Harvard Economic Study deserves a warm welcome from economists, as the first full-dress statistical analysis of *cyclical* depreciation covering a wide field (as distinct from the many studies of local and usually inflationary depreciations, such as the author’s “Assignats”). A mass of relevant data for the crowded years of 1931–35 is admirably collated and displayed, providing a badly needed factual basis for the still urgently topical stabilisation controversy. The accompanying historical commentary is eminently reasonable, and it illuminates many hitherto neglected features of depreciation, such as the extraordinarily small *upward* movement of wage and cost of living indices. But, at risk of seeming ungenerous towards such valuable work, it must be admitted that the author’s unqualified Quantity Theory standpoint prevents him from adding materially

to the theoretical case for flexible parities, sympathetic as he is to that position.

The crucial international aspects of the trade cycle—the unequal incidence of the initial slump of primary prices, the consequent distortion of trade balances (magnified by international debt liquidation), the local deflations due to cost rigidities which only exchange revision can prevent from becoming cumulative, the resulting contraction of incomes which is bound to spread to industrial countries if it is not minimised locally—are not explicitly developed by the author into a systematic case for revision of exchanges aimed to *minimise* the dissemination of cumulative deflationary forces between nations. Nor is it pointed out how seriously the *premature* fall of sterling (due to the quite abnormally unstable financial situation) aggravated world deflation, in contrast with the appropriately timed devaluation of the dollar.

On the other hand, the *domestic* distinctions between these two cases are elucidated most ingeniously, especially how America wanted a maximum rise of home prices to benefit primary income groups, whereas Britain was much more concerned to secure larger foreign markets which would reduce industrial unemployment. Over half the book deals with these two countries, and contains much independent material not directly related to its main theme, but interesting on its own account. Two long chapters discuss many aspects of the New Deal; and Chapters IX and XV describe the technique of exchange management now in operation in America and Britain, though they do not deal with the ultimate implications of these arrangements.

CAMPBELL SECORD.

Scotland's Shifting Population, 1770-1850. By D. F. MACDONALD.
Glasgow: Jackson, Son & Co., Ltd. 1937. 172 pp. 7s. 6d.

Though Scotland has the distinction of being the subject of the first Census taken in Britain, historians have hitherto neglected to deal with her population movements. Dr. Macdonald's book breaks new ground badly in need of cultivation. Planned, except for one chapter, on the lines of Dr. Redford's *Labour Migration in England, 1800-50*, it consists of an outline, mainly statistical, of Scottish population changes between 1770 and 1850. Some reference is made to the period 1750-70 and five dotted maps are based on the Census Reports of 1851. Population growth, rural depopulation, industrial concentration, Irish immigration, town health, the relation between poor-relief and migration, seasonal migration and emigration are successively discussed. However admirable on economic considerations, the growing habit here adopted of relegating references to the end of each chapter is irritating to the reader.

Though he has consulted many authorities and collected numerous

statistics, Dr. Macdonald complains of "the meagreness of the information available." Many of the available statistics and contemporary and other writers' opinions are indeed unreliable, and while often noticing this, Dr. Macdonald tends to quote without attempting to estimate the reliability of his sources. A typical example occurs on pp. 41-2. "Of the parish of Farr, it was said in 1845, that whereas, before the clearances, hundreds of families had lived in the straths, afterwards there were only twenty-four herds. . . . It was said that more than 400 squatters . . . were removed by these [Sutherland] clearances. And one witness, whose antagonism to the landlord's policy may possibly have caused him to exaggerate . . ." For the first statement the authority quoted is the Statistical Account written at least a quarter of a century after the clearances. The second statement originated with James Loch, to whom no reference is made. The "witness" was Hugh Miller, and it is just as necessary to point out that Loch was the landlord's factor as that Miller was antagonistic to the landlord's policy. Census figures, especially those on migration between England and Scotland, are badly handled. One aspect of this movement is unnoticed—that of English temporarily in Scotland teaching trades and, less important, Scots temporarily in England learning. Some attempt is made to ascertain why migration took place, but none to decide whether migrants improved or worsened their condition. If it is inferred that because the town exceeded the rural death-rate, country was preferable to town life, it would be as true to say that the death-toll of Glasgow streets renders life in a trackless Highland glen preferable to life in Glasgow. Attention is wisely drawn to Lowland emigration, but facts regarding emigration are not well marshalled and in spite of Miss Adams' collection of evidence to the contrary, Highland emigration is attributed to "extreme destitution." While Dr. Macdonald tends to emphasise long-distance migration, in a detailed study of the Marchmont estate (Edinburgh University unpublished thesis not mentioned by Dr. Macdonald), Mr. G. S. Maxton found no record of the migration from the Lothians to Glasgow Dr. Redford had alleged there was. This divergence of opinion indicates what is, perhaps, the main fault of Dr. Macdonald's book. More spade-work requires to be done. The huge and difficult surface, however, has been usefully tackled.

MARGARET M. MCARTHUR.

Recent Important Foreign Books on Economics

The Librarian of the British Library of Political and Economic Science has made arrangements, as a supplementary check to the purchases of the Library, to receive regularly every quarter from competent foreign scholars lists of the most important books in their respective fields of study published in their own countries (or languages as the case may be) during the preceding three months. It appeared to the Editorial Board of *ECONOMICA* that these lists might prove useful to other institutions, and the lists of books on economics will therefore be published regularly in future issues of *ECONOMICA*. It must be understood, however, that the Editorial Board of *ECONOMICA* accepts no responsibility for the selection of the books included in the list.

ITALIAN BOOKS

(Selected by Professor Luigi Einaudi).

- BARONE, ENRICO: *Principii di Economia Finanziaria*. (The third volume of the Economic Works.) Bologna. xii, 535 pp.
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The Value of International Trade¹

By J. B. CONDLIFFE

THE title of this inaugural lecture may at first sight appear presumptuous. The greatness of the City of London has been built upon trade and for centuries international trade, flowing mainly through London, has been an important element in the prosperity of the United Kingdom. The important part played by this country in the modern organisation of international trade has been well described by a former teacher of this School.

"During that period (the 19th century) the world's trade pivoted on Great Britain. She was the exchange place of the nations, the financier of the world, the developer of the undeveloped countries. Her ships, sailing or steam, were to be met with at all times within the seven seas, she girded the earth with her rails and moved bulky commodities and foodstuffs with her locomotives and steam engines. She not merely manufactured for the world but she helped to open up continents, to move millions of people to new countries to grow new products and food. She helped to make man the dominant power over nature. She stood to the world for power, enterprise, constructive capacity and financial strength. *Incidentally* during the century she became the centre of two great Empires, one of coloured races and mainly situated in tropical or semi-tropical areas and the other consisting of her own race reproducing her own type of institutions, the first requiring paternal government, the other a common economic, legal and fiscal agreement on the basis of free allied peoples of one race and type."²

As one who comes from the most distant of the Dominions to which Mrs. Knowles alludes, it is perhaps fitting that I

¹ Inaugural Lecture delivered at the London School of Economics and Political Science, March 9th, 1938.

² L. C. A. Knowles, *The Industrial and Commercial Revolutions in Great Britain during the Nineteenth Century*, Routledge, 1921, pp. 117-18.

should begin by recalling the great debt that the whole world owes to the merchants and bankers of Great Britain and especially the City of London. That debt goes far beyond economic bounds. By international trade new countries were developed and old countries revitalised ; a rich variety of new products was made accessible to the common people everywhere¹ and the basis was laid for a long period of peace and prosperity. Upon this material basis it became possible also to develop measures of social welfare, universal education and greatly extended opportunities of cultural development. Moreover many countries, and the Dominions in particular, are deeply indebted to the sturdy independence and practical political capacity of the merchants of England for the great part they played in developing free, democratic institutions, and not less for the magnanimity with which they encouraged their fellow-citizens overseas to claim their birthright of self-government and freedom.

If Mrs. Knowles's statement were as true to-day as it is of the historical period she was describing, this lecture would indeed be superfluous. But the mechanism of international trade no longer functions smoothly and efficiently, its values are seriously challenged in many quarters and for many reasons and the philosophy of peaceful economic co-operation between free democratic peoples is more strongly criticised than it has been for a century. It is true, as M. van Zeeland has pointed out in his recent report to the governments of France and Great Britain, that there remains virtual unanimity of responsible opinion that international trade is desirable ; but it is equally true that the economic and political obstacles to its expansion seem almost insuperable. One is forced to the conclusion that the lip service paid to international co-operation is akin to the religious belief of the man whose small boy agreed that he was a Christian but added that he didn't work very hard at it.

The retrogression of international co-operation and the decay of international responsibility in recent years is largely due, no doubt, to the war and its aftermath. There is some measure of historical comfort to be gleaned from a re-reading of the struggles to regain a sense of economic and political realities after the Napoleonic Wars. There is a familiar

¹ Cf. Knowles, *op. cit.*, p. 221. "For instance, articles like tea, coffee, cocoa, sugar, rice, tapioca, raisins, currants, oranges and lemons which were, even in the fifties of the 19th century, articles which were consumed chiefly by well-to-do people, became, by the end of the century, the necessities of the poor as well as rich,"

ring, for example, in Professor Clapham's discussion of the complicated restrictions imposed on international trade in that period. "France," he records, "was resolute in prohibition . . . Russia, with simple thoroughness, prohibited the entry of all foreign manufactures in 1810."¹ These restrictions on international trade in the early 19th century, however, were not removed without a great deal of effort and after a great deal of suffering. Their ultimate removal was the result of a sustained effort of popular education, undertaken largely by the manufacturers and merchants of this country. In their campaign the men of action were unanimously supported by the teaching of the classical economists. The possibility of intellectual doubt regarding the dogma of free trade hardly existed. The world is always a simpler place when one has a simple faith. Moreover the free-traders of a hundred years ago were sustained by a robust if imperfect and somewhat negative idealism. For them free trade was the straight and narrow path to both peace and prosperity, and of the two peace loomed larger than prosperity.²

At the present time most of the essentials for a successful popular crusade in favour of freer trade are lacking. The Anti-Corn Law League had a great asset in being able to attack a common enemy, the landed interest, an enemy that was open to obvious charges of privilege, inefficiency and obstruction. The advocates of freer trade to-day must face more subtle, dispersed and effective opposition. There is no fortress to be carried by storm but a series of skilfully concealed strong points, the front lines lightly held and readily abandoned in any serious argument, but supported by cross fire from many directions and deepening in strength. Moreover the will to victory is weakened by lack of faith in the cause. Philosophic doubts have arisen. Economists are no longer unanimous even on the broad principles involved. Many of them exercise their subtlety in developing ingenious exceptional cases and some of them question what were until recently regarded as final truths.

¹ J. H. Clapham, *An Economic History of Modern Britain*, Cambridge, 1926, Vol. I, p. 479.

² Cf. Richard Cobden's speech of January 15th, 1846: It is because I do believe that the principle of free trade is calculated to alter the relations of the world for the better that I bless God that I have been allowed to take a prominent part in its advocacy. I see in the Free Trade principle that which shall act on the moral world as the principle of gravitation in the Universe—drawing men together, thrusting aside the antagonism of race and creed and language, and uniting us all in the bonds of peace."

There is some reason, therefore, to restate in broad outline the essential values of international trade.

It is not possible in the time available to consider in detail all the many arguments now propounded either as general principles, or by way of exception, against the thesis that free international trade is desirable from the national point of view. I do not underestimate the importance of a strictly scientific and carefully detailed examination of these arguments, utilising the apparatus of economic analysis under varying assumptions.¹ I am aware that much of the remainder of this lecture is not strictly an exposition of scientific economics, but deals largely with problems of political economy that involve value-judgments. An inaugural lecture, however, is in some degree a confession of faith and the judgments involved in what follows are the conclusions which I have drawn from such reading of economics and history as I have been able to compass and from personal observation of contemporary problems as far as I have come into contact with them.

The broad economic case for international trade, as indeed for trade in general, rests upon the indisputable advantages of specialisation—specialisation of regions, of industrial organisation and of men. The territorial division of labour brought about by international trade results in efficient production in suitable areas and consequently in a greater abundance and cheapness of commodities. There is an impressive unanimity among expert students regarding this broad principle which is indeed in some danger of being regarded as a truism, or a platitude, and therefore of being forgotten. One may quote, as evidence of the agreement of economists on this point, Mr. Keynes's statement that "There are strong presumptions of a general character against trade restrictions unless they can be justified on special grounds. The advantages of the international division of labour are real and substantial, even though the classical school overstated them."² Or Professor Viner's conclusion that "Free Trade, therefore, always makes more commodities available, and, unless it results in an impairment of the distribution of real income substantial enough to offset

¹ A closely argued and convincing critique may be found in Gottfried von Haberler, *The Theory of International Trade with its applications to Commercial Policy*, Hodge, 1936.

² J. M. Keynes, *The General Theory of Employment, Interest and Money*, Macmillan, 1936, p. 338.

the increase in quantity of goods available, free trade operates therefore to increase the national real income."¹

The chief value of international trade from an economic point of view, therefore, is that it makes available to the consumers of the participating countries, not only a wide range of exotic products ; but more abundant and cheaper supplies of goods that could be produced in the importing country, but at higher real cost. Where resources and population are limited it is even possible that a country may gain by concentrating upon the more profitable and importing the less profitable products, even at higher real costs. Much unnecessary confusion of thought has at times arisen in regard to these deductions from the theory of comparative costs. It is essential to remember first that the comparison is of real, not of money costs of production² and secondly that the theory does not compare the costs of the same product in different countries, but the costs of different products in the same country. It may sometimes happen that such a comparison leads to concentrating limited resources upon the more profitable forms of production, just as an individual with limited time may have to concentrate on more remunerative work and employ others to do what, if he had time, he could do more efficiently than they. It is obvious, however, that, in practical life, this extreme development of international trade always tends to disappear as rapidly as labour and resources can be moved to the country where they are lacking.

While there is, among economists at least, little dispute concerning the general benefit of international specialisation, which presupposes international co-operation, certain misconceptions are apt to arise concerning it. The value of international trade does not depend upon a readiness to sacrifice national welfare for vague cosmopolitan sentiment. The case for freer trade is a national case. There is, clearly, a natural affinity between freer trade and international liberalism ; but the essential case for freer trade is that it " increases the real income of all the participating countries."³ Trade indeed shares the quality that Portia attributed to mercy

. " it is twice blest ;
It blesseth him that gives and him that takes."

¹ Jacob Viner, *Studies in the Theory of International Trade*, Allen and Unwin, 1937, p. 534.

² Cf. Viner, *op. cit.*, p. 484.

³ Cf. Haberler, *op. cit.*, p. 221.

This fact cannot be sufficiently stressed at the present time when it is so difficult to persuade any government to take an initiative in the direction of freer trade. The consciousness of national prosperity in a prosperous world seems to have been lost, just as the search for national security has obscured the reality that in the modern world national security can only be achieved as an aspect of collective security. Both in the political and in the economic world we are witnessing a flight from reality, in the name, curiously enough, of realism. Instead of pursuing mutual prosperity the nations are engaged in a process of mutual impoverishment, a fantastic international game of beggar-my-neighbour.

Nor does the case for freer trade necessarily rest upon an individualist, *laissez-faire* economic philosophy. It is true that the exponents of the classical case for free trade were also firm believers in economic individualism and as such opposed legislation to remedy social abuses. It is also true that increasing bureaucratic intervention and regulation of economic activity greatly complicates the smooth working of the price mechanism and therefore often creates situations in which either national legislation or international trade have to be sacrificed. Moreover the growth of large scale enterprises, leading to monopolistic and semi-monopolistic controls of important economic functions, has distorted the competition upon which the classical free-traders relied. Monopoly, however, is not, as is often assumed, an inevitable consequence of technical progress. It is a result of imperfect political and social organisation and could not survive if it were not permitted and even sheltered by legislation. So far, therefore, from the case for freer trade resting upon an individualist *laissez-faire* outlook, it is probable that the preservation and extension of international trade largely depend upon the possibility of effective legislative attack upon privilege, and particularly upon financial, as distinct from technical, monopoly.

As far as social legislation is concerned, it is necessary to distinguish between the elimination of abuses and the maintenance of reasonable wages and living standards on the one hand and on the other the rigid adherence to particular trade practices or monetary wage standards. Few economists would now contend that factory legislation, holidays and reasonably short working hours lower output and are therefore inconsistent with free trade. Nor would they admit

that a high level of real wages can be maintained by the exclusion of imports from countries where wages are lower. On the other hand, if factory legislation and trade union practices harden into an inflexible and harassing system which takes little account of changing technical processes but clings desperately to hardly-won safeguards and if there is excessive rigidity in money wage rates during periods of violent fluctuation in business activity, a point may come where the substantial benefits of international trade may have to be sacrificed for the shadow of a false security.

There is one special case of political and social consequence in recent years where the conflict between social amelioration and international equilibrium appears to be sharp and clear. In more than one country recently a programme of social reform has foundered upon the rock of international competition or the fear of such competition. Two aspects of this situation, as it has existed for instance in France in recent months, should be borne in mind. The strain suddenly thrown on industry by the sudden introduction of new labour codes and standards, based largely upon the fallacy that prosperity can be achieved by suddenly increasing consumers' purchasing power, is not a disproof of the argument that international competition is compatible with the achievement and maintenance of high labour standards. On the contrary it can be argued that it is precisely because the real income of the country has been reduced by a series of economic developments, of which the constriction of international trade and the disorder of the foreign exchanges are not least important, that such brusque attempts to raise standards of living prove an intolerable burden on the national economy.

This consideration leads me to the more serious arguments against a restoration of freer international trade at the present time. Nearly all of these arguments, it will be noticed, are of a short-run character ; but the policies based upon them have gone far to distort the international monetary and trade organisation upon which long-run prosperity must be built. In the passage quoted earlier from Professor Viner, it will be noticed that his conclusion that free trade increases the national real income is qualified by the phrase "unless it results in an impairment of the distribution of real income substantial enough to offset the increase in quantity of goods available." In considering this latter

question Professor Haberler comes to the conclusion that "free trade usually does nothing, at any rate in the long-run, to change the functional distribution of the national income. In so far as it does have any effect on this, it tends rather to favour income from work."¹ While this may be true in the long-run in most cases, it is possible to find situations in which, even in the long-run, the distribution of income would be changed against the social interest by free trade. This I take to be the basic argument of the group of Australian economists who concluded that under protection "employment has been subsidised at the expense of land values, enabling the standard of living to be maintained with a rapidly increasing population."² One of the authors of this study has put the argument in a different form when he confessed that his nightmares always represented Australia as a sheep astride of a precipice with the whole population clinging to its wool! While it may legitimately be doubted whether the authors of this report succeed in proving that "the same average income for the same population could not have been obtained without protection," if by that somewhat ambiguous statement is meant that protection has increased the net national income,³ it may be conceded that without protection it might not have been possible to expand the urban industrial population as rapidly as it has been expanded while maintaining the Australian standard of living. It cannot be assumed that the higher real incomes that would accrue to wool-growers under free trade would necessarily be spent as the national income is now spent, or even in Australia.

This, however, is a special case and the more important arguments against free trade on the grounds of income distribution are concerned with employment and particularly with instability of employment and therefore of income in the short-run. There is no need to spend much time on the argument that tariffs create employment. Of course they do. Mr. Keynes has stated this fact in the clearest terms. "If Protectionists merely mean that under their system men will have to sweat and labour more, I grant their case. By cutting off imports we might increase the aggregate

¹ Haberler, *op. cit.*, p. 225.

² *The Australian Tariff: An Economic Enquiry*, Melbourne University Press, 1929, p. 5.

³ *Ibid.*, p. 9. The statement a few lines lower that "it is probable that the substitution of export production for the more costly of the protected industries would have increased the net income per head," seems to indicate that the passage cited must be read with qualifications.

of work ; but we should be diminishing the aggregate of wages. The Protectionist has to prove not merely that he has made work, but that he has increased the national income. Imports are receipts and exports are payments. How, as a nation, can we expect to better ourselves by diminishing our receipts ? Is there anything that a tariff could do, which an earthquake could not do better ? ”¹ This, however, is a long-run argument, parallel in all respects with Bastiat’s famous argument in the *Petition of the Candle-makers* : “ If you make your duties higher, as in fact you do, upon coal or iron or wheat or cloth from abroad, the lower is their price, how inconsistent would it not be to allow the sunlight, whose price is nil, to have free entry during the whole of each day ! ”²

It is, of course, important to distinguish between aggregate employment and national income and particular forms of employment and returns to particular groups of producers. No discussion on international trade, however brief, can avoid drawing attention to the confusion often created in popular argument by identifying the interests of what Marshall once called “ compact, vocal groups of producers ” with the national interest as a whole. One of the greatest values of international trade is its influence not only in forcing concentration on the most economical use of national resources and labour but the constant stimulus it gives to industrial efficiency and leadership. Economic leadership is like freedom, it must be “ re-created year by year.” Under free trade British manufacturers did not fear but met international co-operation.³ One of the most disquieting aspects of protectionism is the negation of self-reliance and initiative which it breeds. It reverses the process which Professor Fisher describes in his penetrating study, “ *The Clash of Progress and Security*,” by maintaining and even attracting labour and resources to uses that are not the most efficient. Thus the progressive transference of labour and resources from stagnant to developing industries and occupations is hampered, the national income is lowered and the scales are weighted against desirable future developments. It is no disproof of this general argument to admit that there are

¹ *The Nation and Athenæum*, 1st December, 1923.

² Fr. Bastiat, *Sophismes économiques*, Nr. 7.

³ “ ‘ The fight is for commercial supremacy and the battle will be won by the cheapest.’ By cheapness we hold our home markets against the foreigner ; by cheapness we secure the open markets of the world against rival importers ; by cheapness we shall pierce hostile tariff walls.”—C. R. Fay, *Life and Labour in the 19th Century*. Cambridge, 1920.

special cases such, for example, as the motor-car industry in this country where tariff protection may enable an industry to reach the point where it can develop the economies of large-scale production. There are numerous special cases where a judicious interference with competition as it is ruthlessly practised under the semi-monopolistic conditions of large-scale production may yield national gains ; but their existence does not invalidate the argument against trade restrictions in general. Nor can it be presumed that either the industries concerned or official circles will be able to judge accurately the extent of protection necessary to meet these special circumstances or the period during which it should be afforded. That the motor-car industry in this country has enjoyed, at the expense of the consumer, a fair margin of unnecessary protection is surely evident from the profits that have been accumulated in recent years and the levels at which shares in the leading companies are valued.

In the short-run, and under certain conditions, however, it is arguable that the unrestricted entry of imports would cause such a degree of unemployment, and consequently an impairment of income distribution, to say nothing of secondary deflation and possible deterioration of the productive mechanism, as to warrant exceptional measures. This indeed is the real case for the greater part of the exceptional tariffs, quotas, exchange controls and other devices of protectionism in the recent depression. In such a situation as developed in 1931 with prices tumbling and currencies depreciating on every hand, it was politically impossible to resist the clamour for protection of the industries most urgently threatened by floods of cheap imports. If the statesmen concerned had wished to find economic justification for their emergency measures they might have found it in Adam Smith's famous exception to free trade " on the grounds of humanity ".

While, therefore, the rapid improvisation of the new protectionist devices in recent years may easily be understood and even defended as an emergency measure, necessary in the short-run, the failure to remove these new protectionist measures when the emergency passed, their consolidation into a formidable system of neo-mercantilism, and indeed the prior failure to obviate their necessity by timely measures to preserve international equilibrium must be viewed differently. It is not possible here to enter upon a

discussion of the causes that made the recent depression so catastrophic; but it may be noted in passing that the economic disequilibria created by a great war and its aftermath were aggravated by an attempt to rebuild international co-operation upon a credit basis which avoided the painful necessity of drastic readjustments of national economies to a changed international situation. The attempt broke down and unhappily the measures taken to protect national economies from catastrophic changes at the depth of a great depression have in many respects accentuated the previous disequilibria. Quotas and exchange restrictions in particular have not only prevented adaptation; but have fostered the industries that needed to shrink and burdened those which should have been developed. Only in this way can one interpret the remarkable growth of agriculture in industrial countries and of manufactures in agricultural countries in recent years. The net result has been a fantastic divergence of the prices ruling for staple commodities in different national economies. Such products as wheat which formerly enjoyed a world market where fractional price differences would divert supplies from one country to another, now are bought and sold in isolated national markets where the price differs not by fractions but by multiples.

At this point, if time allowed, one ought to discuss in some detail the complicated mechanism of the new protectionism and especially its intimate connection with monetary nationalism and the new faith in monetary manipulation as an easy means of offsetting periodic fluctuations of prosperity and avoiding the painful necessity of continuously adapting national economies to a shifting international equilibrium.¹ It is arguable that the burdens of adjustment imposed on national economies in the post-war period were intolerably difficult and that it was precisely because international trade is such a potent means of peaceful change that it could not be allowed to work freely. But even if one admits that a breakdown of the international monetary and trading systems was inevitable in the post-war world, and that there are short-run situations in which strong financial countries can draw benefits from the pursuit of nationalist monetary and trading policies, the question still remains whether the temporary benefits thus snatched are comparable with the losses sustained in the long-run by the destruction of international co-operation. Professor Röpke recently put

¹ Cf. F. A. von Hayek, *Monetary Nationalism and International Stability*, Longmans, 1937.

this question bluntly when he wrote: "The international sector is being used as a vast dumping-ground of principles, but it is taking a terrible revenge on the different national economies".¹

This, indeed, is the main criticism to be made of those economists and other intellectual workers who have so diligently provided a theoretical basis for practical policies designed to protect particular interests or to combat particular emergencies. It is difficult at any time to keep a sense of proportion in such confused and complicated and rapidly changing situations as those with which we are now confronted almost daily. There is a real danger of losing sight of great essential truths because of our preoccupation with urgent immediate problems. The sacrifice of permanent mechanisms in order to achieve what after all are minor purposes is only too easy in such a time as that through which we are passing. It is always easier to destroy than to rebuild and it may take a generation to reconstruct the international monetary and trading mechanism that was disorganised in an emergency.

Great issues are at stake in the struggle between economic nationalism and international co-operation. They may perhaps be illustrated by the sharp contrast now evident between the attempt of the economic experts of the League of Nations to turn the flank of protectionism by an advocacy of better nutrition and higher living standards and the frank advocacy of economic self-sufficiency for military reasons which is evident in the trading policies of the totalitarian states. On the one hand the ideal is maintained of a continuous enrichment of consumers' satisfactions, such as was achieved by the expansion of international trade in the 19th century. This is particularly important in any plans for improved nutrition. Only by drawing abundant supplies of citrus fruits, butter and other protective foods from countries of specialised production can they be made available to the mass of consumers at prices within their purchasing capacity, at the same time as local agricultural production is expanded to provide perishable commodities such as milk. What is true of nutrition is equally true of the newer manufactures towards which demand turns as living standards rise. The surest and most desirable way to raise real standards of living is to restore a greater freedom of international trade.

¹ W. Röpke, "International Economics in a changing World," in *The World Crisis*, Longmans, 1938, p. 278.

With this ideal may be contrasted the following statement made in April, 1936, by the chief of the department of war economy in the Reichswehrministerium :—

“ War economy merges entirely with the economy renewed and transformed by national-socialism. War economy covers all human life and therefore transforms the social structure. It rests on the absolute will to be prepared from the military point of view. It is the economic principle of the totalitarian state and constitutes the economic preparation for future war which will also be, in the highest degree, totalitarian. A healthy population endowed with military qualities, economical administration of the national patrimony striving to increase national resources and lessen dependence on the foreigner, a war economy well prepared and an army ready to fight are closely linked. A weak army is not able to defend an economy in full profit and the enemy grabs it. But an army, however, strong, cannot exist if it is not fed by a disciplined economy following the principles of war economy . . . As the chemist helps us to be independent of the foreigner in creating synthetic products, so the peasant ought to ensure our food supplies. In times of peace exports are of great importance because they ensure the supplies of raw materials.

“ The German Army attaches the greatest importance to the export effort of the German economy. It knows how capital is the struggle for the world market. War economy is founded above all on the recognition of the fact that the economic is more and more merged in the political world revolution, that it fuses military and economic war. The aim that war economy sets itself in response to this development is defined by the simple words : Be Prepared ”.

The issue between economic nationalism and international co-operation, therefore, is not simply a choice between material abundance and Spartan simplicity ; it is equally a choice between individual liberty and regimentation and probably between peace and war. Those who advocate freer trade, on a world-wide basis if possible and, if that should prove impossible, the most extensive regional basis that can be achieved, are fighting not only for material prosperity, important as that is for the welfare of the great mass of the people of the world ; but for the means of assuring political liberty, scientific progress and cultural development. There is good reason to believe that, even from a narrow nationalist and even military point of view,

international co-operation and the economic prosperity that goes with it are preferable to the subordination of economic life to immediate military needs. Professor Röpke has pointed out that:—

“As against the natural tendency of military experts to apply the principles of military organisation to economic organisation, the economist has to point out how entirely different are the structures of an army and a national economy and, by calculating the cost of autarchy and planning, to make it clear that such a policy might defeat its own purpose by grasping at immediate military advantages at the cost of a serious indirect weakening of the *potentiel de guerre*. It is, indeed, impossible for a country to have, at the same time, the largest possible and the qualitatively best population, the largest possible industry and the greatest possible independence with respect to food and raw materials, brought about by all kinds of governmental intervention. Too much doctoring of the economic structure of a country is the surest way to make it less fit even for military purposes,—just as a wholesale militarisation of society is apt to blunt exactly the qualities most needed for successful warfare.”¹

Even with respect to the elementary necessity of national defence, therefore, granted reasonable precautions against sudden shock tactics, a free economy and international co-operation are preferable to regimented autarky. The case for international trade, however, goes beyond this primitive argument for self-preservation. The whole development of modern social life enabling the mass of humanity to emerge from the status of serfs, dependent upon the humours of small privileged minorities and still more upon an unequal contest with nature, has been correlated with the mingling of peoples brought about primarily by trading activity. Professor Hogben has retold the story of scientific progress and particularly of the emergence of mathematical science almost as a by-product of international trade.² The advances made then were a direct consequence of the extension of trading activity, just as the rebirth of learning after the

¹ W. Röpke, op. cit., Cf. also the same author's “Wehrsystem und Wirtschaftssystem,” *Friedenswarte*, No. I-II, 1935, and *Fascist Economics*, *ECONOMICA*, February, 1935.

² Lancelot Hogben, *Mathematics for the Million*, Allen and Unwin, 1936, pp. 32-4.

“The technique of measurement and counting has followed the caravans and galleys of the great trade routes . . . The beginnings of a size language are to be found in the priestly civilizations of Egypt and Sumeria. From these ancient civilizations we see the first-fruits of secular knowledge radiated along the inland trade routes to China and pushing out into and beyond the Mediterranean, where the Semitic peoples are sending forth ships to trade in tin and dyes . . . The scene shifts to Alexandria, the greatest centre of shipping and the mechanical arts in the

Dark Ages owed at least as much to the scientific knowledge carried along the trade routes as it did to the rediscovery of the antique philosophy. For the modern world, at least, the beginnings of science have proved even more important than the political philosophy of the Greeks.

Mediæval trade enabled the Arabs to bring to Europe three revolutionary inventions—the mariner's compass which made exploration possible, gunpowder which destroyed feudalism, and paper which is the basis of universal education. Can we, in this age of aerial navigation, of wireless telegraphy and chemical progress, believe that these processes of scientific advance on an international front have reached their end?¹

The human race has made progress towards the good life as long as thought and economic activity were left free to cross national boundaries and creeds. Whenever they were confined by the intolerance of priestcraft or nationalism, progress languished. But now we face a new and more formidable superstition than the world has ever known, the myth of the nation-state, whose priests are as intolerant as those of the Inquisition. The struggle for the rights of the individual against the all-powerful and intolerant nation-state is the most difficult and crucial issue of our generation. It is a struggle that must be waged on many fronts, and the international front is not the least of these. The struggle is not new, but is the modern form of a fight that has been waged over many centuries—the fight for intellectual freedom against intolerant superstition. In the modern world individuals seek release from their narrow lives and interests by identification with wider national aims. Few will make genuine sacrifices for personal religion and martyrs are scarce; but whole communities submit cheerfully to sacrifices in the national interest and vast armies will undergo martyrdom for King and Country. The real religion of the modern world is patriotism. It is a genuine and valuable emotion; but like all religious impulses it degenerates easily and the superstitions that cluster thick about it offer the most formidable obstacles to intellectual freedom at the present time.

ancient world. Men are thinking about how much of the world remains to be explored. Geometry is applied to the measurement of the heavens. Trigonometry takes its place. The size of the earth, the distance of the sun and moon are measured . . . Along the trade routes this new arithmetic is brought into Europe by Jewish scholars from the Moorish universities of Spain and by Gentile merchants trading with the Levant, some of them patronized by nobles whose outlook had been unintentionally broadened by the crusades. Europe stands on the threshold of the great navigations. Seafarers are carrying Jewish astronomers who can use the star almanacs which Arab scholarship had prepared. The merchants are becoming rich. More than ever the world is thinking in large numbers."

¹ Cf. Robert Briffault, *The Making of Humanity*, Allen and Unwin, 1919, Ch. VI.

The Analysis of Vital Statistics

By R. R. KUCZYNSKI

I

MARRIAGE STATISTICS.

IN most official statistical publications the frequency of marriages is measured by relating the number of marriages to the number of inhabitants. The marriage rate thus computed does not convey a true picture of nuptiality since it is calculated without regard to the proportion of marriageable people within the total population. According to the censuses of 1926 the proportion of unmarried people over 20 years was 11.7 per cent. in Bulgaria and 33.5 per cent. in the Irish Free State. It is evident that a comparison of the marriage rates in these two countries would be utterly misleading.

A number of statistical bureaux, therefore, publish in addition to the marriage rate of the total population the ratio of marriages to the marriageable population. The Registrar-General's *Statistical Review of England and Wales* thus shows regularly (1) "Persons married per 1,000 population of all ages," (2) "Males married per 1,000 single and widowed males, aged 15 and over," and (3) "Females married per 1,000 single and widowed females, aged 15 and over". It appears, for example, that while the marriage rate for the total population was practically the same in 1866-70 (16.4), 1896-1900 (16.1), and 1931-35 (16.2), the rate for marriageable males was 60.5, 54.5, and 56.1 respectively and that for marriageable females 51.5, 45.6, and 43.7. The rates for the marriageable population are certainly less deceptive than the rates for the total population. However, they are calculated without regard to the specific age composition of the marriageable men and women, and since nuptiality is much higher among younger than among older adults, the rates for the marriageable population, other things being equal, will tend to be

low whenever the unmarried people over 35 constitute a large proportion of the total unmarried people over 15. In England the proportion of unmarried females over 35 increased from 34.5 per cent. in 1901 to 44.4 per cent. in 1931. If, then, the specific marriage rate of the unmarried females between 15 and 35 had increased in the meantime from, say, 70 to 80 per 1,000 and that of the unmarried females over 35 from 7 to 8, the rate for all marriageable females would have decreased from 48.3 to 48.0 because of the greater "weight" of those over 35 in 1931.

But the marriage rates of the marriageable population suffer from still another defect. They do not take account of the marital condition of those who marry. This, however, is necessary because the re-marriages, both from an economic and a social view-point, differ, on the whole, from first marriages, and because their numerical importance is by no means constant. It may suffice to mention that the proportion of widowed or divorced bridegrooms in England and Wales, which 60 years ago was 14 per cent., had dropped by 1936 to 8 per cent. while the proportion of widowed or divorced brides had decreased from 10 to 5 per cent. (after having reached a maximum of 13 per cent. in 1919). Some statistical bureaux, therefore, publish separate marriage rates for single, for widowed, and for divorced persons, or distinguish at least between first marriages and re-marriages by relating the number of marrying bachelors to the total number of bachelors at marriageable age, the number of marrying spinsters to the total number of spinsters at marriageable age, and so on. The Registrar-General's *Statistical Review of England and Wales* thus shows that in 1935 the marriage rate of the widows was 8.0 per 1,000 as against 59.9 for spinsters and divorced.¹ But a comparison of these rates is absolutely meaningless. The chances of marrying were apparently greater at each age for widows than for spinsters.² That the marriage rate of the widows

¹ The *Statistical Review* gives the marriage-rates of (a) bachelors and divorced men, (b) widowers, (c) spinsters and divorced women, and (d) widows. This lumping together of single and divorced persons was immaterial 60 years ago when the marrying divorced persons numbered only 100 a year and constituted only 0.2 per cent. of the re-marrying persons but it is most confusing to-day, since in 1936 not less than 6,468 or 14 per cent. of the re-marrying persons had been divorced.

² The *Statistical Review* for 1935 (Text, p. 166) states: "Comparison of the rates for spinsters and widows shows that the latter have the advantage in all age groups except at 15-20 and 25-35". The exception for the age group 15-20 is due to the fact that in 1935 no widow under 20 married. (In 1934, when five such widows married, the marriage rate of widows at the ages 15-20 was four times as high as that of spinsters.) That the marriage rate in the age group 25-35 was lower for widows than for spinsters may be due to the fact that most spinsters

as a whole appears so low is due exclusively to their higher average age. The marriage rate of spinsters, on the other hand, is much higher than the marriage rate of all unmarried females at marriageable age because of the low average age of the spinsters.

The most common method of computing the yearly marriage rate of spinsters is to compute the number of marrying spinsters per 1,000 spinsters of over 15 years. It appears that in England and Wales this rate increased from 1934 to 1936 from 59.2 to 61.0, or by 3 per cent., while the marriage rate of all unmarried adult females increased from 46.4 to 46.9, or by only 1 per cent. But it would be a great mistake to conclude therefrom that the nuptiality of the spinsters actually increased in these two years by something like 3 per cent. If the girls aged 15 of whom none married and the spinsters over 55 of whom very few marry are eliminated it appears that the marriage rate of spinsters rose from 70.3 to 74.7, or by 6 per cent. If in addition also the girls aged 16 and the spinsters over 45 are eliminated, i.e., if the total first marriages are related to the spinsters at the ages 17-44 (who provide 98 or 99 per cent. of all first marriages) it appears that this ratio increased from 83.0 to 92.0 per 1,000 or by 11 per cent. If the elimination is carried out still further by relating, as is frequently done in official statistics, the total first marriages to spinsters at the ages 20-44, it appears that this ratio increased from 109.0 to 117.7 per 1,000 or by 8 per cent. The increases indicated by these various rates then differ widely, and none of them affords an adequate gauge for the measurement of the actual nuptiality of spinsters since they do not take any account of the specific age distribution within the group of spinsters considered (20-44, or 17-44, etc.).

The best method of ascertaining nuptiality is to compute the probability of marrying for single persons at each year of age and to derive therefrom the proportion of those who get married (once or more than once) and those who never marry. The problems involved in constructing such a

between 25 and 35 are under 30 while most widows between 25 and 35 are over 30. It should be realised moreover that the official marriage rates of widows at various ages may be quite erroneous since in view of the lack of any record of the number of deceased husbands the total number of widows and still more so their age composition are not known in intercensal years. (Conditions will improve in this respect about seven years from now when the data to be secured through the Population (Statistics) Act may be used to derive from the 1941 census figures the age composition of the widows in 1942 and subsequent years.)

nuptiality table are essentially the same as those arising in constructing a life table :

I. Life Table for total female population.

If F_n indicates the mean (or mid-year, mid-period) number of females n years old,

D_n the females dying at age n years,

q_n the probability for a female of dying at age n years,

p_n the probability for a female of surviving age n years,

$$q_n = \frac{D_n}{F_n + \frac{1}{2}D_n}$$

$$p_n = 1 - \frac{D_n}{F_n + \frac{1}{2}D_n}$$

If, then, l_n indicates the females surviving n years of age,

$$l_{n+1} = p_n \times l_n$$

$$l_{n+1} = \frac{F_n - \frac{1}{2}D_n}{F_n + \frac{1}{2}D_n} \times l_n \quad (1)$$

IIa. Life Table for spinsters.

If f_n indicates the mean number of spinsters n years old,

d_n the spinsters dying at age n years,

m_n the spinsters marrying at age n years,

l'_n the females surviving n years of age as spinsters,

$$l'_{n+1} = \frac{f_n + \frac{1}{2}m_n - \frac{1}{2}d_n}{f_n + \frac{1}{2}m_n + \frac{1}{2}d_n} \times l'_n \quad (2)$$

IIb. Nuptiality Table for spinsters.

$$l''_{n+1} = \frac{f_n + \frac{1}{2}d_n - \frac{1}{2}m_n}{f_n + \frac{1}{2}d_n + \frac{1}{2}m_n} \times l''_n \quad (3)$$

The method of computing such a nuptiality table for spinsters may be illustrated by the example of England and Wales, 1930-32¹ :

Surviving as spinsters 16 years = 1,000.

Surviving as spinsters 17 years :

$$\frac{351,530 + (737 \times 0.5) - (745 \times 0.5)}{351,530 + (737 \times 0.5) + (745 \times 0.5)} \times 1,000 = 997.89$$

¹ Basic data, see Table 1, cols. 1-3.

Surviving as spinsters 18 years :

$$\frac{349,299 + (822 \times 0.5) - (3,287 \times 0.5)}{349,299 + (822 \times 0.5) + (3,287 \times 0.5)} \times 997.89 \\ = 0.99064 \times 997.89 = 988.55$$

Surviving as spinsters 19 years :

$$\frac{343,392 + (829 \times 0.5) - (9,164 \times 0.5)}{343,392 + (829 \times 0.5) + (9,164 \times 0.5)} \times 988.55 \\ = 0.97370 \times 988.55 = 962.55$$

This table shows that according to the nuptiality prevailing in England in 1930-32 out of 1,000 girls reaching marriageable age 838 get married while 162 remain unmarried. Such a table has then the advantage not only of conveying a truer picture of nuptiality than the marriage rate for the total or for the marriageable population, but also a clearer picture. The fact that in England, 1930-32, 16 per 1,000 inhabitants did marry while 984 did not, or that 52 per 1,000 spinsters did marry while 948 did not, is rather meaningless. But the fact that according to the nuptiality of this period 838 girls get married while 162 remain unmarried is most instructive.

Tables of the kind just described show the *gross nuptiality rate*, i.e., the proportion of girls who, according to the prevailing nuptiality, would get married, if none of the girls died before having reached the age at which the oldest spinster does marry. There is no difficulty, of course, in computing in a similar manner the *net nuptiality rate*, i.e., the proportion of girls who, according to the prevailing nuptiality and mortality, would get married. While in computing the gross nuptiality the results are identical whether all girls are considered or only those reaching marriageable age, in computing net nuptiality the starting point is of paramount importance since a considerable number of girls die before having reached the marriageable age. Tables of net nuptiality for females are usually computed by starting with age 15 or 16 and, then, show how many out of 1,000 girls, reaching marriageable age and subject to the prevailing nuptiality and mortality, would get married.

Net nuptiality may be computed as follows. If

q_n indicates the probability for a spinster of marrying or dying at age n years,

l'''_n the females surviving n years of age as spinsters according to nuptiality and mortality,

$$q_n = \frac{d_n + m_n}{f_n + \frac{1}{2}d_n + \frac{1}{2}m_n}$$

$$l'''_{n+1} = \frac{f_n - \frac{1}{2}d_n - \frac{1}{2}m_n}{f_n + \frac{1}{2}d_n + \frac{1}{2}m_n} \times l'''_n \quad (4)$$

Example, England 1930-32 :

Surviving as spinsters 16 years = 1,000.

Surviving as spinsters 17 years, nuptiality : 997.89
nuptiality and mortality :

$$\frac{351,530 - (737 \times 0.5) - (745 \times 0.5)}{351,530 + (737 \times 0.5) + (745 \times 0.5)} \times 1,000 = 995.79$$

Surviving as spinsters 18 years, nuptiality :

$$0.99064 \times 995.79 = 986.47$$

nuptiality and mortality :

$$\frac{349,299 - (822 \times 0.5) - (3,287 \times 0.5)}{349,299 + (822 \times 0.5) + (3,287 \times 0.5)} \times 995.79$$

$$= 0.98831 \times 995.79 = 984.15$$

Surviving as spinsters 19 years, nuptiality :

$$0.97370 \times 984.15 = 958.27$$

nuptiality and mortality :

$$\frac{343,392 - (829 \times 0.5) - (9,164 \times 0.5)}{343,392 + (829 \times 0.5) + (9,164 \times 0.5)} \times 984.15$$

$$= 0.97132 \times 984.15 = 955.92.^1$$

It will be seen from Table I that out of 1,000 girls reaching marriageable age, considering departures through nuptiality alone, 174 are unmarried at age 50, and considering departures both through nuptiality and mortality, 151. The total number of spinsters marrying, if mortality is not considered, is 838, and if mortality is considered, 815. The gross nuptiality rate, then, is 0.838 and the net nuptiality rate 0.815.

The gross and the net nuptiality rates fulfil the same

¹ It may seem at first sight that the survivors, according to nuptiality and mortality combined, may be computed by multiplying the survivors according to the gross nuptiality by the survivors according to the life table for spinsters. But this would presuppose that

$$\frac{f_n + \frac{1}{2}d_n - \frac{1}{2}m_n}{f_n + \frac{1}{2}d_n + \frac{1}{2}m_n} \times \frac{f_n + \frac{1}{2}m_n - \frac{1}{2}d_n}{f_n + \frac{1}{2}m_n + \frac{1}{2}d_n} = \frac{f_n - \frac{1}{2}d_n - \frac{1}{2}m_n}{f_n + \frac{1}{2}d_n + \frac{1}{2}m_n}$$

Actually the left part of the equation exceeds the right part by

$$\frac{d_n m_n}{(f_n + \frac{1}{2}m_n + \frac{1}{2}d_n)^2}$$

The difference, however, is very small if mortality is low, and in this case the approximation obtained by using the life table is rather close. For England 1930-32, the survivors according to the gross nuptiality are 0.16230, and according to the life table for spinsters, 0.29327. The product is 0.04760 while the survivors according to net nuptiality are 0.04726.

TABLE I.
NUPTIALITY TABLES FOR SPINSTERS, ENGLAND AND WALES, 1930-1932.

Years of age.	Living 27th April 1931 (1)	Deaths Average 1930-32 (2)	Gross Nuptiality		Net Nuptiality				
			Marriages Average 1930-32 (3)	Survivors (4)	Marriages (5)	Nuptiality Survivors (6)	Nuptiality and Mortality Survivors (7)	Marriages (8)	Deaths (9)
16	351,530	737	745	100,000	211	100,000	100,000	211	210
17	349,299	822	3,287	99,789	934	99,789	99,579	932	232
18	343,392	829	9,164	98,855	2,600	98,647	98,415	2,588	235
19	330,910	861	15,298	96,255	4,344	95,827	95,592	4,314	243
20	311,875	821	20,709	91,911	5,900	91,278	91,035	5,844	231
21	296,202	795	30,344	86,011	8,369	85,191	84,960	8,267	216
22	270,887	756	30,641	77,642	8,301	76,603	76,477	8,177	202
23	242,489	674	30,770	69,341	8,263	68,300	68,098	8,115	178
24	210,508	607	28,773	61,078	7,804	59,983	59,805	7,641	161
25	182,064	530	24,639	53,274	6,743	52,164	52,003	6,583	141
26	159,654	477	20,707	46,531	5,660	45,420	45,279	5,507	127
27	136,721	448	16,358	40,871	4,607	39,772	39,645	4,469	122
28	120,385	393	12,733	36,264	3,637	35,176	35,054	3,516	109
29	103,286	374	9,555	32,627	2,880	31,538	31,429	2,774	109
30	97,542	330	7,444	29,747	2,183	28,555	28,546	2,095	93
31	84,055	291	5,282	27,564	1,676	26,451	26,358	1,603	88
32	78,646	298	4,337	25,888	1,387	24,755	24,667	1,321	91
33	72,430	269	3,282	24,501	1,084	23,346	23,255	1,029	84
34	70,610	269	2,839	23,417	921	22,226	22,142	871	83
35	67,263	255	2,322	22,496	762	21,271	21,188	718	78
36	65,144	257	1,871	21,734	614	20,470	20,392	576	79
37	61,078	255	1,594	21,120	543	19,816	19,737	507	82
38	62,012	268	1,447	20,577	474	19,230	19,148	441	81
39	57,533	259	1,230	20,103	424	18,707	18,626	393	83
40	58,283	283	1,051	19,679	351	18,233	18,150	324	87
41	49,847	264	789	19,328	303	17,826	17,739	278	93
42	53,359	308	783	19,025	276	17,461	17,368	252	100
				18,749		17,116	17,016		

43	50,488	294	660	18,506	243	16,796	16,697	220	99
44	48,038	281	559	18,292	214	16,504	16,408	193	96
45	48,590	304	539	18,091	201	16,228	16,126	180	102
46	46,232	332	458	17,913	178	15,968	15,853	158	115
47	44,605	356	421	17,745	168	15,705	15,579	148	126
48	45,990	368	407	17,589	156	15,442	15,319	137	123
49	43,796	363	362	17,445	144	15,193	15,067	126	126
50	45,435	375	343	17,314	131	14,954	14,831	113	123
51	38,693	378	228	17,213	101	14,744	14,601	87	143
52	40,375	421	231	17,115	98	14,518	14,401	83	151
53	38,257	399	199	17,027	88	14,293	14,167	74	149
54	38,844	423	176	16,950	77	14,144	14,020	64	152
55	36,962	432	164	16,875	75	13,867	13,705	61	162
56	35,666	469	143	16,808	67	13,650	13,472	55	178
57	32,634	469	122	16,746	62	13,422	13,230	50	192
58	33,779	537	117	16,689	57	13,185	12,976	45	209
59	30,834	515	99	16,636	53	12,935	12,720	41	215
60	31,767	526	87	16,591	45	12,686	12,477	34	209
61	26,492	499	67	16,550	41	12,446	12,213	31	233
62	26,874	569	68	16,509	41	12,182	11,927	31	255
63	26,332	577	61	16,471	38	11,900	11,641	27	259
64	25,053	611	62	16,431	40	11,613	11,332	28	281
65	25,252	648	65	16,389	42	11,303	11,017	29	286
66	22,545	640	40	16,360	29	10,998	10,690	19	308
67	21,813	677	33	16,336	24	10,674	10,348	16	326
68	20,987	703	30	16,313	23	10,334	9,993	14	341
69	19,099	733	36	16,283	30	9,975	9,599	18	376
70	19,261	750	20	16,266	17	9,589	9,223	10	366
71	16,099	758	9	16,257	9	9,218	8,794	5	424
72	15,123	825	9	16,248	9	8,789	8,322	5	467
73	14,028	799	2	16,246	2	8,321	7,860	1	461
74	12,759	785	5	16,240	6	7,857	7,388	3	469
75	11,652	840	4	16,235	5	7,386	6,872	2	514
76	10,001	805	2	16,232	3	6,871	6,339	1	532
77	8,405	726	—	16,232	—	6,339	5,814	—	525
78	7,479	733	—	16,232	—	5,814	5,271	—	543
79	6,559	714	1	16,232	2	5,270	4,726	1	544
80-	29,794	5,256	—	16,230	—	—	—	—	4,726
Total	5,383,686	38,620	203,823	16,230	83,770	—	—	81,456	18,544

purposes in measuring nuptiality as the gross and net reproduction rates do in measuring fertility. The gross reproduction rate relates the number of female births to the number of females who would be living if none died before having passed the child-bearing age; the net reproduction rate relates the number of female births to the number of females as reduced by mortality. The gross nuptiality rate relates the number of first marriages to the number of spinsters who would be living if none died before having passed the marriageable age; the net nuptiality rate relates the number of first marriages to the number of spinsters as reduced by mortality. The first gross reproduction rates were computed nearly a quarter of a century after the first net reproduction rates had been computed. The first gross nuptiality rates were apparently computed about half a century after the first net nuptiality rates had been computed. That net reproduction rates were computed much earlier than gross reproduction rates was due to the fact that for a long time the decrease of fertility was generally considered as a natural reaction to the still greater decrease of mortality and that births, therefore, seemed of interest only in relation to deaths. That net nuptiality rates were computed much earlier than gross nuptiality rates was due to the fact that they were needed for the purposes of dowry assurance which has to consider the probability of marrying as reduced by mortality.

The first net nuptiality table was computed in 1862 by Theodor Wittstein. He prepared it merely in order to illustrate by a numerical example the application of the formula he had worked out for computing net nuptiality and therefore chose his basic data rather at random. He used the marriage rates which he had found in a contemporary newspaper¹ and the mortality rates of Brune's life tables based on the experience of the General Widows' Fund of Berlin, 1776 to 1845. His table included also a column

¹ This note which has played such a prominent part in the literature on nuptiality tables appeared in the evening edition of the *Berliner Börsenzeitung* of 17th April, 1862. It began as follows :—

Berlin, 17th April.

We learn that a pension fund for unmarried daughters of officials is being organised in the State of Anhalt. This news is certainly liable to arouse great joy among officials and we therefore wish every success to this undertaking. We follow up this note with some observations about the statistics of marriages which should certainly attract general interest. We begin for this purpose with a nuptiality table of 1,000 girls who are at the ages of life mentioned below.

showing the "probability of ever marrying."¹ The first to use this method for the purpose of ascertaining the nuptiality of a given population was Richard Böckh. He computed in 1884 the net nuptiality rate for the female population of Berlin on the basis of marriages and deaths in 1876-1880.² A few more net nuptiality rates were

Age Years	Marrying :	Age Years	Marrying :	Age Years	Marrying :
16 ..	13	28 ..	102	40 ..	46
17 ..	19	29 ..	95	41 ..	47
18 ..	26	30 ..	82	42 ..	43
19 ..	37	31 ..	68	43 ..	35
20 ..	51	32 ..	61	44 ..	26
21 ..	66	33 ..	58	45 ..	20
22 ..	80	34 ..	57	46 ..	16
23 ..	90	35 ..	53	47 ..	14
24 ..	95	36 ..	50	48 ..	13
25 ..	99	37 ..	49	49 ..	11
26 ..	103	38 ..	48	50 ..	12
27 ..	103	39 ..	46	51 etc. ..	0

Then followed some facetious "observations" about the equality of the probability of marrying at 16 and at 48 and other playful remarks of a similar kind.

The famous statistician Zeuner, who seven years later computed a net nuptiality table from the same basic data as Wittstein, extrapolated the marriage rates for the ages 51 to 60 pointing out that the rates for these later years (contrary to those given in the Berlin newspaper) were not "observed values" and stated in a footnote: "It was not possible for me to learn who prepared this table of the *Berliner Börsenzeitung*; from the text attached to the table one must assume that it owes its origin to the plan of creating in Anhalt-Dessau a pension fund for unmarried daughters of officials." (See Gustav Zeuner, *Abhandlungen aus der Mathematischen Statistik*, p. 150, Leipzig, 1869.)

Erwin Moll, in 1914, after having mentioned a few other nuptiality tables said: "Apart from these, the only one known to me covering a whole population is the 'Nuptiality Table of the Female Sex' in the evening edition of the *Berliner Börsenzeitung* of 17th April, 1862. . . . On the basis of what material, how, and by whom this table was computed could not even be ascertained any more by Zeuner in 1869." (Erwin Moll, *Heiratsstatistik für Bayern und Hamburg 1880-1911*, p. 16, Göttingen, 1919.)

Quite recently Somogyi listed the table in the *Berliner Börsenzeitung* as "the first nuptiality tables" ever computed. (See Stefano Somogyi, "Tavole di nuzialità et di vedovanza per la popolazione italiana 1930-1932," *Annali di Statistica*, Series VII, Vol. I, p. 203, Rome, 1937.)

Since apparently no country or city published marriage rates of spinsters by years of age as far back as 1862, Zeuner's assumption that the table reproduced in the *Berliner Börsenzeitung* was prepared in connexion with the plan of creating a pension fund in Anhalt-Dessau seems plausible. But there is not the least evidence that it was based, as he thinks, on observations. Moll, a very cautious investigator, it is true, contended that the table refers to a whole population, but since he said at the same time that the material used in preparing the table is not known, his opinion on this point does not carry much weight. In every population we know of the marriage rates for the earliest years of age at which girls marry are considerably lower than the rates given in the *Berliner Börsenzeitung*, and this is particularly so in populations where the highest rates are to be found at so late an age as 26 or 27 years. It rather seems therefore that the rates reproduced in the *Berliner Börsenzeitung* were invented by a man who had an inadequate knowledge of the distribution of marriages by age, and there is not the least evidence that he had any knowledge of the concept of probabilities. There is then no justification whatsoever for considering that table as a nuptiality table.

¹ See Theodor Wittstein "Die Mortalität in Gesellschaften mit successiv eintretenden und ausscheidenden Mitgliedern," *Archiv der Mathematik und Physik*, Vol. 39, pp. 91-92, Greifswald, 1862.

² See *Die Bevölkerungs- und Wohnungs-Aufnahme vom 1. December 1880 in der Stadt Berlin*, Vol. III, p. 12, Berlin, 1888. Though Böckh, to be sure, was interested mainly in the demographic aspects of nuptiality, he too undertook his investigation with a view of providing a basis for dowry assurance. Küttner, about at the same time, computed nuptiality tables

computed before the War by the author¹ and by Mortara,² and a considerable number in the course of the last twenty years.³

The first concept of gross nuptiality is to be found in the writings of Karup. He distinguishes clearly between the "ordinary probability of marrying" (net nuptiality) and the "independent probability of marrying" (gross nuptiality) "which arises if one eliminates mortality as a disturbing factor."⁴ The first who ascertained the gross nuptiality rate for a given population was apparently Erwin Moll. He computed in 1914 rates both for Bavaria and for Hamburg for the six quinquennial periods from 1881-86 to 1906-11.⁵ Similar gross nuptiality rates were computed by the Statistical Department of Denmark,⁶ by the author,⁷ and by Somogyi.⁸

For countries with a low mortality in the age groups where most girls marry a close approximation to the gross nuptiality rate may be obtained by disregarding the exposure

to death, i.e., by substituting $\frac{m_n}{f_n + \frac{1}{2}m_n}$ for $\frac{m_n}{f_n + \frac{1}{2}d_n + \frac{1}{2}m_n}$, since the difference $\frac{\frac{1}{2}d_n m_n}{(f_n + \frac{1}{2}d_n + \frac{1}{2}m_n)(f_n + \frac{1}{2}m_n)}$ then, is very

for males as a basis for a widow pension assurance of Saxon miners (see W. Küttner, "Die Eheschliessungen im Königreiche Sachsen mit besonderer Berücksichtigung des Bergmannsstandes," *Beilage zur Zeitschrift des Königlich Sächsischen Statistischen Bureaus* 1885, pp. 15-82). But he considered that for his purpose it was not necessary to exclude re-marriages, and he did not compute the nuptiality rate.

¹ Berlin, 1886, 1887 and 1888; see *Statistisches Jahrbuch der Stadt Berlin* 1898, p. 23, Berlin, 1900.

² Italy 1899-1902 and Milan 1899-1902; see Giorgio Mortara, *Le popolazioni delle grandi città italiane*, pp. 49-52, Turin, 1908.

³ See Somogyi, pp. 195-292.

⁴ See Johannes Karup, *Die Finanzlage der Gotbaischen Staatsdiener-Witwen-Societät am 31. Dezember 1890*, p. 42, Dresden, 1893. It is interesting to note that Karup's approach even to gross nuptiality is that of the assurance expert: "By probability of marrying, generally speaking or in the formerly accepted sense, is usually understood the proportion arising in a society of unmarried (single or widowed) persons within a certain definite period (in most cases a year) between the number of members at the beginning and the number of marriages, provided this society acquires no additional members in the course of the year under consideration, and provided withdrawals take place only when marriages and deaths occur. Now I understand by independent probability of marriage a similar proportion; it relates, however, to a society which differs from the former inasmuch as in this society each death is at once replaced by an unmarried person newly entering."

⁵ See Moll, pp. 26-31.

⁶ Denmark, 1911-15, 1916-20, 1921-25, and 1926-30; see *Statistique du Danemark, Mariages, Naissances et Décès*, 1916-20, p. 11*, Copenhagen, 1924; 1926-30, p. 10*, Copenhagen, 1934.

⁷ England, 1930-32; see "The Decrease of Fertility," *ECONOMICA*, May, 1935, p. 139.

⁸ Italy, 1899-1902 and 1930-32; Switzerland, 1901-10; and Germany, 1910-11, 1925, and 1933. See Somogyi, pp. 258, 268-69.

small.¹ But it is not permissible to compute the gross nuptiality rate by substituting the force of nuptiality for the probability of marrying, i.e., by substituting $\frac{m_n}{f_n}$ for

$\frac{m_n}{f_n + \frac{1}{2}d_n + \frac{1}{2}m_n}$, since the difference $\frac{\frac{1}{2}d_n m_n + \frac{1}{2}m_n^2}{f_n^2 + \frac{1}{2}f_n d_n + \frac{1}{2}f_n m_n}$ may be considerable.²

Whether a sufficiently close approximation may be obtained if marriages are available only by quinquennial age groups is a controversial question. Moll, on the basis of the data for Berlin, 1876-80, most emphatically denied the possibility.³ In recent years, however, various authors have undertaken to compute nuptiality rates from quinquennial data.⁴ Since the correct formula for computing the number of spinsters surviving age 21 years is

$$l''_{21} = \frac{f_{20} + \frac{1}{2}d_{20} - \frac{1}{2}m_{20}}{f_{20} + \frac{1}{2}d_{20} + \frac{1}{2}m_{20}} \times l''_{20} \quad (3)$$

there are obviously two formulas for dealing with the probability of surviving as spinsters at age 25 years: either

$$l''_{25} = \left(\frac{f_{20-24} + \frac{1}{2}d_{20-24} - \frac{1}{2}m_{20-24}}{f_{20-24} + \frac{1}{2}d_{20-24} + \frac{1}{2}m_{20-24}} \right)^5 \times l''_{20} \quad (5)$$

¹ For England, 1930-32, the gross nuptiality rate computed by neglecting deaths is 0.83832, while the correct rate is 0.83770.

² The difference between the close approximation (omitting $\frac{1}{2}d_n$ in the denominator) and the substitution of the force of nuptiality (omitting also $\frac{1}{2}m_n$ in the denominator) is $\frac{\frac{1}{2}m_n^2}{f_n^2 + \frac{1}{2}f_n m_n}$.

The number of females surviving at various ages according to nuptiality in France, 1930-32, appears to be as follows:—

Years of age.	$q_n = \frac{m_n}{f_n + \frac{1}{2}m_n}$	$q_n = \frac{m_n}{f_n}$
14	10,000	10,000
20	7,725	7,639
25	3,309	3,024
30	1,832	1,610
35	1,367	1,190
40	1,163	1,010
45	1,063	922
50	1,008	874

P. Depoid ("Tables de nuptialité et de fécondité pour la France, 1930-1932," *Bulletin de la Statistique générale de la France*, January-March, 1937, pp. 319-320) uses the formula $\frac{m_n}{f_n}$ and thus obtains as spinsters surviving at age 50, 87.4 per 1,000, a figure which is far too small. He finds similarly as spinsters surviving in England, 1930-32, at age 50, 156 per 1,000 (see "Un indice de nuptialité," *Bulletin de l'Institut international de statistique*, Vol. XXIX, part II, p. 14) while the correct formula yields 174 per 1,000.

³ See Moll, pp. 1-2.

⁴ See Depoid in *Statistique du mouvement de la population*, 1933, Vol. I, p. 66; David Glass, "Changes in Fertility in England and Wales, 1851 to 1931" in *Political Arithmetic*, edited by Lancelot Hogben, p. 168, London, 1938.

$$\text{or } l''_{25} = \frac{f_{20-24} + 2\frac{1}{2}d_{20-24} - 2\frac{1}{2}m_{20-24}}{f_{20-24} + 2\frac{1}{2}d_{20-24} + 2\frac{1}{2}m_{20-24}} \times l''_{20} \quad (6)$$

Formula (5) yields the same result as the correct formula (3) if the probability of surviving as spinster is the same for each year of age within the quinquennial age group, i.e., if

$$\frac{f_{20} + \frac{1}{2}d_{20} - \frac{1}{2}m_{20}}{f_{20} + \frac{1}{2}d_{20} + \frac{1}{2}m_{20}} = \frac{f_{21} + \frac{1}{2}d_{21} - \frac{1}{2}m_{21}}{f_{21} + \frac{1}{2}d_{21} + \frac{1}{2}m_{21}} = \text{etc.}$$

Formula (6) yields the same result as the correct formula if

(1) $d_{20}, d_{21}, d_{22}, d_{23},$ and d_{24} all equal zero,

(2) $m_{20} = m_{21} = m_{22} = m_{23} = m_{24},$

(3) either $f_{20} - f_{21} = f_{21} - f_{22},$ etc.,

or $l''_{20} - l''_{21} = l''_{21} - l''_{22},$ etc.¹

Whether formula (5) yields a greater or a smaller proportion of surviving spinsters than formula (6) depends largely on the ratio of deaths to marriages.² For England 1930-32 the situation would be as on p. 151:

¹ This latter alternative was suggested to me by Mr. Max Lacroix.

² Let us for brevity sake substitute f for f_{20-24} , d for d_{20-24} , and m for m_{20-24} . If $d=0$ (or what amounts to the same, if only the close approximation is sought), formula (5) yields a greater proportion of surviving spinsters than formula (6) because

$$\left(\frac{f - \frac{1}{2}m}{f + \frac{1}{2}m}\right)^5 - \frac{f - 2\frac{1}{2}m}{f + 2\frac{1}{2}m} = \frac{10f^5m^3 + 1\frac{1}{2}fm^5}{f^6 + 5f^5m + 8\frac{1}{2}f^4m^2 + 7\frac{1}{2}f^3m^3 + 3\frac{7}{16}f^2m^4 + 1\frac{1}{8}fm^5 + \frac{5}{8}m^6}$$

If, on the other hand, $d=m$, formula (5) yields a smaller proportion of surviving spinsters than formula (6) because

$$\left(\frac{f}{f+m}\right)^5 - \frac{f}{f+5m} = -\frac{10f^4m^2 + 10f^3m^3 + 5f^2m^4 + fm^5}{f^6 + 10f^5m + 35f^4m^2 + 60f^3m^3 + 55f^2m^4 + 26fm^5 + 5m^6}$$

If $d > m$, formula (5) yields likewise a smaller proportion of surviving spinsters than formula (6).

If finally $d < m$, formula (5) may or may not yield a smaller proportion of surviving spinsters than formula (6):

$$\begin{aligned} & \left(\frac{f + \frac{1}{2}d - \frac{1}{2}m}{f + \frac{1}{2}d + \frac{1}{2}m}\right)^5 - \frac{f + 2\frac{1}{2}d - 2\frac{1}{2}m}{f + 2\frac{1}{2}d + 2\frac{1}{2}m} \\ &= -\frac{10f^4dm + 20f^3d^2m - 10f^3m^3 + 15f^2dm^3 - 10f^2d^2m^2 + 5fd^4m - 2\frac{1}{2}fd^2m^3 - 1\frac{1}{2}fm^5 + \frac{1}{8}d^5m - \frac{5}{8}dm^5}{(f + \frac{1}{2}d + \frac{1}{2}m)^5(f + 2\frac{1}{2}d + 2\frac{1}{2}m)} \end{aligned}$$

It is obvious that in this case not only the ratio of d to m but also the size of f play a part. Dr. E. C. Rhodes very kindly provided me with the following "Table giving limited values of $\frac{d}{f}$ appropriate to given values of $\frac{m}{f}$ ":

$\frac{m}{f}$	$\frac{d}{f}$	$\frac{m}{f}$	$\frac{d}{f}$
0.01	0.00010	0.06	0.00359
0.02	0.00040	0.07	0.00488
0.03	0.00090	0.08	0.00636
0.04	0.00160	0.09	0.00804
0.05	0.00249	0.10	0.00991

For a given value of $\frac{m}{f}$, (5) is less than (6) if $\frac{d}{f}$ is greater than the corresponding limiting value, and (5) is greater than (6) if $\frac{d}{f}$ is less than the corresponding limiting value. Example: If $\frac{m}{f} = 0.06$, then if $\frac{d}{f}$ is 0.006 or any other value greater than 0.00359, (5) is less than (6), but if $\frac{d}{f}$ is 0.003 or any other value less than 0.00359, (5) is greater than (6).

Years of age.	Spinners 27th April 1931	Marriages Average 1930-32	Deaths Average 1930-32	Probability of surviving as spinners.			Surviving Spinners.		
				Formula (5)	Formula (6)	Formula (3)	Formula (5)	Formula (6)	Formula (3)
16-19	1,375,131	28,494	3,249	92,056	92,077	91,911	92,056	92,077	91,911
20-24	1,332,051	141,237	3,653	58,866	58,319	57,963	54,190	53,698	53,274
25-29	702,110	83,992	2,222	54,996	54,235	55,838	29,802	29,123	29,747
30-34	403,283	23,184	1,457	75,053	75,065	75,624	22,367	21,861	22,496
35-39	313,030	8,464	1,294	87,380	87,458	87,478	19,544	19,119	19,679
40-44	260,015	3,842	1,430	92,896	92,968	92,952	18,156	17,775	18,292
45-49	229,213	2,187	1,723	95,359	95,424	95,370	17,313	16,962	17,445
50-54	201,604	1,177	1,996	97,138	97,191	97,163	16,818	16,486	16,950
55-59	169,875	645	2,422	98,134	98,184	98,147	16,504	16,187	16,636
60-64	136,518	345	2,782	98,756	98,805	98,768	16,299	15,994	16,431
65-69	109,096	204	3,401	99,088	99,141	99,099	16,150	15,857	16,283
70-74	77,270	45	3,917	99,715	99,742	99,736	16,104	15,816	16,240
75-79	44,096	7	3,818	99,925	99,935	99,938	16,092	15,806	16,230

It appears that only for the age groups 20-24 and 25-29, where marriages are very much more numerous than deaths, formula (5) yields a larger proportion of surviving spinsters than formula (6). But the difference here is so great that the final proportion of girls who never marry is greater if calculated by formula (5) than if calculated by formula (6). The gross nuptiality rate according to formula (5) is 0.839 and according to formula (6) 0.842 while according to the correct formula (3) it is 0.838. Other tests showed likewise a closer approximation to the correct nuptiality rate if formula (5) was used. It should be noted, however, that for individual age groups the error involved in using formula (5) proves frequently to be greater than if formula (6) is used. There is then no conclusive evidence that one formula is intrinsically better than the other. Either of them may be used without much risk if the object is merely to obtain a fairly close approximation to the correct nuptiality rate.

Gross nuptiality rates have been computed so far for one or another country for one and another period. This means that they have not yet been used adequately. If we have ascertained the gross reproduction rate or the mean expectation of life at birth in a given country for a year or a series of years we have acquired a most valuable knowledge. We may compare the level of fertility or mortality in this country with that of other countries, and since the age composition of the population does not change much from one year to the next we may by looking at the absolute numbers of births or deaths in the preceding and the following years draw conclusions about the trend of fertility or mortality in each of these countries. If, on the other hand, we have ascertained the gross nuptiality rate in a given country for a year or a series of years the knowledge which we have gained thereby consists merely in that we have learned the actual frequency of first marriages in this period. A comparison with the gross nuptiality rates of other countries in the same or another period would, as a rule, not be very instructive because the frequency of marriages is everywhere subject to considerable changes from one year to the next without, as a rule, showing a definite trend. If the number of marriages in each of the countries which we would compare were the same in 1933-35 as in 1930-32 it may well be that in some countries nuptiality in the

second period was much lower than in the first period, while in other countries it was much higher.

It may seem surprising at first sight that while the trend in the number of births for a series of years indicates rather correctly the trend of fertility the trend of nuptiality may differ so considerably from the trend in the number of marriages. The explanation for this difference is that while the number of births in one period does not at all affect the number of births in the next period the number of marriages in one period may affect most essentially the number of marriages in the next. Let us assume that in a given country the number of spinsters reaching marriageable age were year-in year-out 300,000 and the number of deceased spinsters 100,000. If then, 200,000 spinsters married each year, nuptiality, other things being equal, would be the same year-in year-out. If, however, only 150,000 married, the number of spinsters would increase constantly while nuptiality would decrease constantly. If, on the other hand, 250,000 married year-in year-out, nuptiality would increase constantly. Or to put it otherwise: in such a country the number of marriages may increase for ten consecutive years, say, by 5,000 each and then decrease for ten consecutive years, say, by 5,000 each while nuptiality may remain about the same all the time.

In England, the number of first marriages oscillated between 261,518 and 275,756 from 1922 to 1926 and between 284,207 and 296,914 from 1927 to 1932. It then rose to 301,388 in 1933, 324,799 in 1934, 331,751 in 1935, and 336,634 in 1936. If the number of marriages had been particularly low in the years of depression the rise which started in the second quarter of 1933 would not necessarily have meant a corresponding rise in nuptiality because the stock of spinsters might have increased considerably during the depression. But marriages had been actually rather numerous in 1930-32. I, therefore, suspected that in the following years nuptiality had increased even much more than indicated by the number of marriages and suggested to Mr. David Glass that it would be interesting to compute nuptiality tables for each of the years 1931 to 1936. With his kind permission I am reproducing here his results (see Table II). It appears that according to the nuptiality prevailing in these years the proportion of spinsters who

TABLE II.
GROSS NUPTIALITY TABLES, ENGLAND AND WALES, 1931-1936.

Years of age.	Surviving as Spinsters.					
	1931	1932	1933	1934	1935	1936
16	100,000	100,000	100,000	100,000	100,000	100,000
17	99,775	99,759	99,762	99,717	99,688	99,703
18	98,821	98,810	98,793	98,721	98,556	98,363
19	96,220	96,153	96,138	95,883	95,645	95,096
20	91,819	91,798	91,729	91,162	90,623	90,015
21	85,969	86,008	85,725	84,860	84,086	83,142
22	77,470	77,843	77,321	75,795	74,680	73,625
23	69,088	69,522	68,974	66,655	65,280	64,125
24	60,695	61,216	60,312	57,767	56,115	54,500
25	52,966	53,358	52,254	49,367	47,871	45,908
26	46,310	46,637	45,207	42,107	40,491	38,742
27	40,643	40,928	39,422	36,094	34,436	32,705
28	36,150	36,323	34,749	31,325	29,686	27,982
29	32,474	32,655	30,974	27,603	25,931	24,244
30	29,637	29,841	28,150	24,779	23,090	21,513
31	27,376	27,625	25,948	22,590	20,946	19,403
32	25,677	25,965	24,385	21,039	19,452	17,918
33	24,377	24,516	23,007	19,783	18,201	16,742
34	23,331	23,487	21,887	18,786	17,265	15,839
35	22,419	22,609	21,022	17,899	16,457	15,121
36	21,657	21,863	20,327	17,261	15,766	14,482
37	21,031	21,265	19,725	16,701	15,276	13,943
38	20,513	20,744	19,259	16,235	14,870	13,561
39	20,032	20,264	18,817	15,831	14,477	13,197
40	19,625	19,841	18,441	15,499	14,170	12,901
41	19,267	19,478	18,100	15,193	13,881	12,655
42	18,988	19,195	17,861	14,966	13,675	12,443
43	18,705	18,926	17,579	14,741	13,462	12,249
44	18,465	18,692	17,350	14,547	13,272	12,079
45	18,264	18,491	17,140	14,383	13,122	11,931
46	18,066	18,288	16,949	14,221	12,975	11,787

47	17,887	18,105	16,784	14,085	12,842	11,669
48	17,718	17,940	16,647	13,959	12,714	11,570
49	17,549	17,791	16,500	13,836	12,590	11,464
50	17,412	17,653	16,362	13,743	12,494	11,367
51	17,284	17,526	16,238	13,648	12,404	11,290
52	17,182	17,436	16,146	13,563	12,331	11,218
53	17,080	17,343	16,063	13,475	12,261	11,159
54	16,982	17,262	15,976	13,406	12,186	11,099
55	16,908	17,189	15,907	13,347	12,129	11,046
56	16,838	17,125	15,837	13,293	12,080	11,007
57	16,778	17,056	15,773	13,247	12,037	10,966
58	16,718	16,999	15,717	13,196	12,003	10,931
59	16,653	16,956	15,658	13,148	11,963	10,895
60	16,604	16,902	15,604	13,109	11,929	10,860
61	16,557	16,863	15,563	13,074	11,904	10,836
62	16,517	16,821	15,523	13,042	11,875	10,810
63	16,470	16,782	15,486	13,008	11,847	10,786
64	16,432	16,743	15,454	12,985	11,818	10,773
65	16,396	16,701	15,412	12,949	11,781	10,749
66	16,358	16,666	15,377	12,922	11,755	10,726
67	16,337	16,639	15,353	12,903	11,739	10,706
68	16,308	16,622	15,332	12,892	11,724	10,694
69	16,287	16,604	15,315	12,881	11,710	10,684
70	16,254	16,578	15,298	12,863	11,696	10,671
71	16,241	16,563	15,283	12,850	11,683	10,658
72	16,231	16,554	15,279	12,841	11,674	10,649
73	16,219	16,548	15,271	12,832	11,669	10,642
74	16,214	16,548	15,266	12,829	11,664	10,637
75	16,205	16,542	15,264	12,825	11,662	10,630
76	16,201	16,535	15,262	12,822	11,661	10,627
77	16,198	16,532	15,259	12,820	11,661	10,623
78	16,198	16,532	15,257	12,820	11,659	10,621
79	16,196	16,532	15,255	12,820	11,659	10,621
80	16,196	16,530	15,253	12,818	11,655	10,618
81	16,196	16,530	15,253	12,818	11,655	10,615

did not marry was 162, 165, 153, 128, 117 and 106 respectively per 1,000 girls reaching marriageable age.

While the number of marriages rose between 1934 and 1936 only from 324,799 to 336,634, nuptiality increased so much that the proportion of spinsters who did not marry decreased from 128 to 106 per 1,000 girls reaching marriageable age. This is due to the fact that the stock of spinsters was depleted by 1934 to such an extent that if nuptiality had remained constant the number of marriages would have declined considerably in the following years. If the marriage rates at each year of age had been the same in 1935 as in 1934, the number of marriages in 1935 would have been 8,162 less than in 1934. If the rates had been the same in 1936 as in 1935, the number of marriages in 1936 would have been 10,082 less than in 1935.

TABLE III.

GROSS NUPTIALITY RATES AND EXPECTED AND ACTUAL MARRIAGES,
ENGLAND AND WALES, 1931-1936.¹

Year	Gross Nuptiality Rate	Expected Marriages ²	Actual Marriages	Expected Change		Actual Change		Genuine Change	
				Number	Per cent.	Number	Per cent.	Number	Per cent.
1931	0.838	—	294,148	—	—	—	—	—	—
1932	0.835	293,027	290,407	-1,121	-0.4	-3,741	-1.3	-2,620	-0.9
1933	0.847	289,267	301,388	-1,140	-0.4	+10,981	+3.8	+12,121	+4.2
1934	0.872	296,716	324,799	-4,672	-1.6	+23,411	+7.8	+28,083	+9.5
1935	0.883	316,637	331,751	-8,162	-2.5	+6,952	+2.1	+15,114	+4.8
1936	0.894	321,669	336,634	-10,082	-3.0	+4,883	+1.5	+14,965	+4.7

It appears that in England each year from 1932 to 1936 would have witnessed a decline in the number of marriages if the annual rates of the preceding year had been in operation. The situation was quite different in a country such as Sweden, 1923-33, where nuptiality was very low. There the "expected" number of marriages for each year was greater than the actual number of marriages of the preceding year. But the rise of nuptiality which started in the third quarter of 1933 apparently marked a turning point.

Of all the problems connected with the analysis of marriage statistics I have so far discussed the most important one, the measurement of the nuptiality of single persons. I

¹ No account has been taken of the fact that 1932 and 1936 were leap years.

² Marriages which would have occurred if the annual marriage rates of the preceding year had been in operation.

shall deal here with only one more problem, the measurement of the mean age at marriage of single persons.

TABLE IV.

GROSS NUPTIALITY RATES AND EXPECTED AND ACTUAL MARRIAGES, SWEDEN, 1923-1935.¹

Year	Gross Nuptiality Rate	Expected Marriages ²	Actual Marriages	Expected Change		Actual Change		Genuine Change	
				Number	Per cent.	Number	Per cent.	Number	Per cent.
1923	0.784	—	36,387	—	—	—	—	—	—
1924	0.772	36,875	35,951	+488	+1.3	- 436	-1.2	- 924	-2.5
1925	0.767	36,424	36,137	+473	+1.3	+ 186	+0.5	- 287	-0.8
1926	0.769	36,583	36,932	+446	+1.2	+ 795	+2.2	+ 349	+1.0
1927	0.771	37,421	37,665	+489	+1.3	+ 733	+2.0	+ 244	+0.7
1928	0.779	38,076	39,129	+411	+1.1	+1,464	+3.9	+1,053	+2.8
1929	0.784	39,436	40,269	+307	+0.8	+1,140	+2.9	+ 833	+2.1
1930	0.799	40,426	42,379	+157	+0.4	+2,110	+5.2	+1,953	+4.8
1931	0.790	42,533	41,423	+154	+0.4	- 956	-2.3	-1,110	-2.6
1932	0.777	41,744	40,212	+321	+0.8	-1,211	-2.9	-1,532	-3.7
1933	0.790	40,388	41,948	+176	+0.4	+1,736	+4.3	+1,560	+3.9
1934	0.822	41,799	46,443	-149	-0.4	+4,495	+10.7	+4,644	+11.1
1935	—	45,949	—	-494	-1.1	—	—	—	—

The method which is almost universally used in measuring changes in the age at marriage consists in computing for various periods the average age of those who marry and comparing the results. If this average age has increased the conclusion is drawn that "people nowadays marry later than in former times." Although it has been known for more than two centuries that changes in the mean length of life cannot be ascertained by simply comparing the average age at which people die, it is still supposed that changes in the mean length of "single" life of brides and bridegrooms can be ascertained by simply comparing the average age at which people marry. It is obvious, however, that if, owing, for example, to a heavy decrease in fertility, the proportion of younger spinsters decreases the average age at marriage may increase even if the nuptiality of the younger spinsters rises while that of the older spinsters declines.

The mean age at marriage of spinsters, i.e., the mean expectation of single life at birth for those who marry, can be derived from a nuptiality table in the same manner as the mean expectation of the total life at birth is derived

¹ No account has been taken of the greater length of leap years.

² Marriages which would have occurred if the annual marriage rates of the preceding year had been in operation.

from the life table. The mean length of life is ascertained by computing the years lived by 100,000 live-born and dividing the sum by 100,000; the mean length of unmarried life of those who marry is ascertained by adding the years they live in the single state and dividing the sum by their number.

The years lived in the single state by those who marry may be derived either from the net nuptiality table (which takes account of mortality) or from the gross nuptiality table (which eliminates the effects of mortality). Johannes Rahts, twenty years ago, used for this purpose the net nuptiality tables which he had computed for Germany 1910-11.¹ The Statistical Department of Denmark, more recently, used its gross nuptiality tables for 1911-15, 1916-20, 1921-25, and 1926-30.² The procedure may be illustrated by the example of England and Wales, 1930-32:

According to net nuptiality 81,456 out of 100,000 girls reaching marriageable age marry in the course of their lives. These future brides live $81,456 \times 16 = 1,303,296$ years before attaining the age of 16. At the age of 16 years, 211 marry.³ Assuming that these brides were all exactly $16\frac{1}{2}$ years old when they married, they would live 105.5 years in single state and 105.5 years in married state. The total years lived in single state by the 81,456 girls between the age of 16 and 17 years would then be $81,456 - 105.5 = 81,350.5$. Of the $81,456 - 211 = 81,245$ future brides who survive the age of 17 as spinsters 932 marry before attaining the age of 18. The total years lived in single state by the 81,245 girls between the age of 17 and 18 years is then $81,245 - 466 = 80,779$. The number of years lived in single state may be computed in the same manner for each subsequent year of age. It will then be found that the total number of years lived in single state by the 81,456 girls who marry is 2,093,147.⁴ This means that, on an average, they live 25.70 years in single state. According to the nuptiality and mortality prevailing in England, 1930-32, the mean age at marriage of the girls reaching marriageable age would, then, be 25.70 years.

¹ See *Statistik des Deutschen Reichs*, Vol. 275, pp. 40*, 42*, Berlin, 1918.

² See *Statistique du Danemark, Mariages, Naissances et Décès*, 1916-20, pp. 11*-12*, Copenhagen, 1924; 1926-30, p. 11*, Copenhagen, 1934.

³ See Table I, col. (8).

⁴ See Table V, col. (4). Col. (5) shows the years lived by the 13,818 girls who die as spinsters before having reached the age of 80. Since mortality under 16 is neglected these 13,818 girls would live 221,088 years before attaining the age of 16. At the age of 16 years 210 die (see

The result would be exactly the same if the mean age at marriage were to be derived from a net nuptiality table which, instead of starting with 100,000 girls reaching marriageable age, started with 100,000 newly-born girls. Since according to the English Life Table for 1930-32, out of 100,000 newly-born girls 90,247 survive the age of 16, the number of future brides would be $81,456 \times 0.90247 = 73,512$; the number of girls who die as spinsters before having reached the age of 80 would be $100,000 - 90,247 + (13,818 \times 0.90247) = 22,223$; and the number of spinsters who die after attaining the age of 80 would be $4,726 \times 0.90247 = 4,265$. The 73,512 future brides would live $73,512 \times 16 = 1,176,192$ years before attaining the age of 16. The number of years lived at 16-17 and at each subsequent year of age would be reduced in the same proportion, and the total number of years lived in single state by the 73,512 girls who marry would be 1,889,013 or 25.70 years on an average.

The average number of years lived in single state, as derived from the net nuptiality table, is the best gauge of the mean age at marriage. But it is obviously affected by mortality. Let us suppose that at 30 years 33,000 girls had died instead of 330.¹ The number of girls who marry would then be reduced from 81,456 to 78,156. The total number of years lived by them in single state would be 1,969,078 instead of 2,093,147, and their average age at marriage would be 25.19 years instead of 25.70. If then the object of the investigation is to ascertain the changes in the age at marriage caused exclusively by changes in nuptiality it seems preferable to derive the years lived in single state by those who marry from the gross nuptiality table.

The procedure to be followed in deriving the mean age at marriage from the gross nuptiality table is briefly as

Table I, col. 9). The total years lived by the 13,818 girls between the age of 16 and 17 would then be $13,818 - 105 = 13,713$. The total number of years lived by the 13,818 girls at the ages 0-79 years appears to be 778,982. As to the 4,726 girls who die single after having attained the age of 80 they live $4,726 \times 80 = 378,080$ years at the ages of 0-79 years. The years lived in single state at the ages 0-79 by the entire group of 100,000 girls who reach marriageable age may be found by adding the years lived by the 81,456 girls who marry, the 13,818 girls who die as spinsters under 80, and the 4,726 girls who die as spinsters over 80. They live at ages under 16 altogether 1,600,000 years, between the age of 16 and 17 years $81,350.5 + 13,713 + 4,726 = 99,789.5$ years, etc. (see Table V, col. 3). The years lived in single state by the entire group of 100,000 girls may also be found directly. Of these 100,000 girls 211 marry and 210 die at age 16. They then live $100,000 - 105.5 - 105 = 99,789.5$ years between 16 and 17 years.

¹ See Table I, col. (2).

TABLE V.
YEARS LIVED AS SPINSTERS ACCORDING TO NUPTIALITY, ENGLAND AND WALES, 1930-32.

Years of age.	Gross Nuptiality.		Net Nuptiality.		
	100,000 reaching age 16. (1)	83,770 who marry. (2)	100,000 reaching age 16. (3)	81,456 who marry. (4)	13,818 who die single under 80. (5)
0-16	1,600,000	1,340,320	1,600,000	1,303,296	221,088
16-17	99,894.5	83,664.5	99,789.5	81,350.5	13,713
17-18	99,322	83,092	98,997	80,779	13,492
18-19	97,555	81,325	97,003.5	79,019	13,258.5
19-20	94,083	77,853	93,313.5	75,568	13,019.5
20-21	88,961	72,731	87,997.5	70,489	12,782.5
21-22	81,826.5	65,596.5	80,718.5	63,433.5	12,559
22-23	73,491.5	57,261.5	72,287.5	55,211.5	12,350
23-24	63,209.5	48,979.5	63,951.5	47,065.5	12,160
24-25	57,176	40,946	55,904	39,187.5	11,990.5
25-26	49,902.5	33,672.5	48,641	32,075.5	11,839.5
26-27	43,701	27,471	42,462	26,030.5	11,705.5
27-28	38,567.5	22,337.5	37,349.5	21,042.5	11,581
28-29	34,445.5	18,215.5	33,241.5	17,050	11,465.5
29-30	31,187	14,957	29,087.5	13,905	11,356.5
30-31	28,655.5	12,425.5	27,452	11,470.5	11,255.5
31-32	26,726	10,496	25,512.5	9,621.5	11,165
32-33	25,194.5	8,964.5	23,961	8,159.5	11,075.5
33-34	23,959	7,729	22,698.5	6,984.5	10,988
34-35	22,956.5	6,726.5	21,665	6,034.5	10,904.5
35-36	22,115	5,885	20,790	5,240	10,824
36-37	21,427	5,197	20,064.5	4,593	10,745.5
37-38	20,848.5	4,618.5	19,442.5	4,051.5	10,665
38-39	20,340	4,110	18,887	3,577.5	10,583.5
39-40	19,891	3,661	18,388	3,160.5	10,501.5
40-41	19,503.5	3,273.5	17,944.5	2,802	10,416.5
41-42	19,176.5	2,946.5	17,553.5	2,501	10,326.5
42-43	18,887	2,657	17,192	2,236	10,230
43-44	18,627.5	2,397.5	16,856.5	2,000	10,130.5

follows: According to gross nuptiality in England and Wales, 1930-32, 83,770 out of 100,000 girls reaching marriageable age get married. These girls live $83,770 \times 16 = 1,340,320$ years before attaining the age of 16. At the age of 16 years 211 marry.¹ The total years lived in single state by the 83,770 girls between the age of 16 and 17 years would then be $83,770 - 105.5 = 83,664.5$. Of the $83,770 - 211 = 83,559$ future brides who survive the age of 17 as spinsters, 934 marry before attaining the age of 18. The total years lived in single state by the 83,559 girls between the age of 17 and 18 years would be $83,559 - 467 = 83,092$. The total number of years lived in single state by the 83,770 girls who marry is 2,169,467.² This means that on an average they live 25.90 years in single state.

According to the Registrar-General's *Statistical Review* the mean age at marriage of spinsters increased uninterruptedly from 25.47 years in 1931 to 25.61 years in 1936. Since this increase occurred in a period in which the number of marriages rose considerably it seemed safe to draw the conclusion that the additional marriages were largely contracted by couples who, owing to the depression, had postponed their wedding. But what actually happened was just the opposite. The mean age at marriage derived from the gross nuptiality table decreased uninterruptedly from 25.87 years in 1931 to 25.08 years in 1936. The additional marriages were largely early marriages.

TABLE VI.

MEAN AGE AT MARRIAGE OF SPINSTERS IN SWEDEN AND ENGLAND.

Year.	Sweden.		Year.	Sweden.		England.	
	Official.	Correct.		Official.	Correct.	Official.	Correct.
1923	26.67	27.42	1930	26.42	26.89	25.50	—
1924	26.56	27.36	1931	26.45	26.96	25.47	25.87
1925	26.48	27.30	1932	26.47	27.04	25.48	25.84
1926	26.48	27.26	1933	26.50	26.92	25.54	25.74
1927	26.47	27.24	1934	26.52	26.59	25.57	25.42
1928	26.49	27.13	1935	—	—	25.59	25.26
1929	26.41	27.00	1936	—	—	25.61	25.08

¹ See Table I, col. (5).² See Table V, col. (2). The total number of years lived at the ages 0-79 by the 16,230 girls who do not marry is $16,230 \times 80 = 1,298,400$. Col. (1) shows the years lived in single state at the ages 0-79 by the entire group of 100,000 girls who reach marriageable age.

A comparison of the official and the correct figures of the mean age at marriage in Sweden shows likewise that the usual method of computing the mean age is utterly misleading. Nuptiality there rose enormously in 1934. According to the official publication the mean age at marriage was higher in 1934 than in any one of the nine preceding years. But the correct mean age at marriage derived from the gross nuptiality table was actually much lower in 1934 than in any one of the eleven preceding years and probably presents a low record for a still much longer period.

*(The second part of this article will appear
in the August issue.)*

Statistical Evidence on the Acceleration Principle

By J. TINBERGEN

I

THEORETICAL INTRODUCTION

1. Much attention has recently been given to the so-called "acceleration principle" or "the Relation" as Mr. Harrod¹ calls it. Developed by Professors Aftalion, Bickerdike, Bouniatian, Carver, Fanno, Kuznets and Pigou, it has been given special attention by Professor J. M. Clark in his splendid survey *Strategic Factors in Business Cycles*²; and has obtained a place in many theories of the business cycle. Professor Haberler,³ from whom part of the above references are taken, also uses it in his own synthesis of theories; Mr. Harrod regards the acceleration principle and the multiplier principle acting in combination as the chief forces in trade cycles. Quite recently Dr. Chait⁴ has developed a theory implying as special cases both the acceleration principle and the multiplier principle.

2. The principle in its simplest form can be best seen in a simplified example.⁵ Let the value of the yearly output of (say) shoes be 100. The cost of the fixed capital equipment required for this output may be 500, 10 per cent. of which must be replaced each year. Then, new machines at the cost of 50 must be constructed each year for replacement. Now, suppose the demand for shoes rises, so that production must be increased by 10 per cent. to 110 a year. If there is no excess capacity and if methods of production are not changed, this increase necessitates an increase of 10 per cent. in the stock of fixed capital; that is, an additional production of machinery of 50, being an increase of 100

¹ R. F. Harrod, *The Trade Cycle. An Essay.* Oxford, 1936.

² Cf. also J. M. Clark, "Business Acceleration and the Law of Demand," *Journal of Political Economy*, XXV, pp. 217-235. (1917.)

³ G. von Haberler, "Prosperity and Depression," *A Theoretical Analysis of Cyclical Movements.* Geneva, 1937, League of Nations.

⁴ B. Chait, *Les fluctuations économiques et l'interdépendance des marchés.* Brussels, 1938.

⁵ Taken from Haberler, *loc. cit.*, p. 84.

per cent. In this simplest form the principle states that percentage changes in the *production* of consumers' goods are equal to percentage changes in the *stock* of capital goods. As the latter is usually considerably larger than the annual *production* of capital goods, the corresponding percentage changes in the latter are much larger than the percentage changes in the production of consumers' goods. The principle has two aspects between which it is useful to distinguish:

(a) the correlation aspect: there must be correlation between new investment in durable capital goods and the *rate of increase* in consumers' goods production;

(b) the regression aspect: the percentage fluctuations in consumers' goods production are *equal* to the percentage fluctuations in the stock of capital goods. The first aspect states something about the correlation coefficient between two variables; the second aspect about the numerical value of the regression coefficient.

3. There is some doubt about the causal direction of the relation mentioned. Sometimes causality is not considered at all; the principle is only meant to explain the difference in intensity between consumers' goods production and producers' goods production. In other cases, however, the principle is meant to explain investment fluctuations. Changes in consumption are then taken as given; fluctuations in investment activity are deduced. In any case this seems to me the more interesting aspect of the matter and, at the same time, the kind of relationship we need for business cycle theory.

4. In its more rigorous form, the acceleration principle can only be true if the following conditions are fulfilled.

(a) Very strong decreases in consumers' goods production must not occur. If the principle were right, they would lead to a corresponding disinvestment and this can only take place to the extent of replacement. If annual replacement amounts to 10 per cent. of the stock of capital goods, then a larger decrease in this stock than 10 per cent. per annum is impossible. A decrease in consumers' goods production of 15 per cent. could not lead to a 15 per cent. decrease in physical capital as the acceleration principle would require. It is interesting that this limit is the sharper the greater the duration of life of the capital goods considered.

(b) There should be no abrupt changes in technique

leading to a sudden increase in the amount of capital goods necessary to the production of one unit of consumers' goods.

In its more rigorous form, the principle is equivalent to saying that a constant part of productive capacity is idle and that entrepreneurs never increase production of consumers' goods before having increased correspondingly their capacity. In the case of this constant part being zero—i.e., full occupation of capacity at any moment—this is, at least for increases, a necessity; in all other cases this policy would have to be followed deliberately, and there are hardly enough reasons to suppose this occurs in reality.

In particular there are reasons to expect the principle to break down in times of heavy decreases in production (cf. what was said under (a)) as well as in the periods immediately following such decreases, until production has reached capacity again. It is only at that moment that the *necessity* of the principle's action recurs.

5. The acceleration principle may, however, be given a less rigorous form. Instead of equality of percentage changes in consumers' goods production and capital goods' stock there may be assumed to be only proportionality or even only a linear relationship. This means that there would still be correlation but that the regression coefficient would be less than one. Two reasons exist for giving the principle its less rigorous form:

(a) During a period of increasing production, not all firms and not all branches attain at the same moment the point of full capacity. Suppose that for the individual firms the principle acts only—and then of course in its rigorous form—when full capacity is reached; then to a given increase in total production for all firms a smaller percentage increase in total stock of capital goods may correspond. Something similar may happen with heavy decreases in production: some firms may show decreases going beyond the critical one mentioned in section 4, sub. (a), others may remain within the critical boundary. Supposing that in such times all firms simply do not replace worn-out capacity, there will again be a percentage decrease in physical capital stock which is smaller than the percentage decrease in consumers' goods production. (This statement holds, of course, equally well for any individual firm going beyond the critical decrease.)

Of course, it is not at all certain in these circumstances

that the regression coefficient will have to be the same for every moment. Much depends on the distribution of decreases over firms and on the distribution of idle capacity over firms. But there will be a tendency to a regression coefficient below one. It may be added already here that in fact the material used by Professor Clark in his first exposition of the principle showed this very clearly; the regression coefficient being about one-half instead of one. It may also be added that the magnifying effect may, nevertheless, still exist. If the rigorous acceleration principle would lead to percentage fluctuations in capital goods production ten times as large as those in consumers' goods production, then in the less rigorous form these percentage fluctuations would still be five times as great.

(b) A second reason for the less rigorous form of the acceleration principle might be that even with idle capacity a firm would expand its plant proportionally to the rate of increase in consumers' goods production, but not by an equal percentage. This would mean that there would not be an immediate necessity for investment but that the willingness to invest would depend chiefly on the rate of increase in consumers' goods production.

It seems important to remind the reader that we have been considering three situations in which a firm may find itself:

- (i) full capacity used and increasing production;
- (ii) heavily decreasing production, as defined under 4 (a);
- (iii) all other situations.

If the less rigorous acceleration principle were caused only in the way indicated under 5 (a), at least part of the firms should be in the situations (i) and (ii) during most of the period studied. There is reason to doubt whether this is so for the post-war period or even for many pre-war years. If this doubt is justified, the only way in which the principle could still be fulfilled would be the one indicated under 5 (b). The behaviour of entrepreneurs assumed there seems, however, less natural than the behaviour assumed under 5 (a). Therefore I think there must be already for theoretical reasons some doubt as to the validity of the acceleration principle. In my opinion an explanation of investment fluctuations by profit fluctuations¹ is more natural, and for this reason a comparison between these two competing explanations has been made in some of

¹ To be called shortly "the profit principle."

the cases considered. It would, however, lead us too far to go into a detailed consideration of the relationship between profits and investment.

6. One further amendment of the acceleration principle may be mentioned for reasons of completeness. Dr. Staehle, in a private discussion, suggested that the correlation would exist between new investment activity and the *shift in the demand curve* for consumers' goods instead of the increase in the actual quantity demanded or produced. This seems indeed more natural especially in the following situation: suppose that, with full capacity used, demand increases, but as productive capacity cannot be expanded immediately, the quantities produced cannot rise correspondingly. Prices will rise instead. Nevertheless it is natural to assume that there will be new investment. Dr. Staehle's hypothesis can be given an especially convenient form if the elasticity of demand is unity (which, approximately, will be the case for "all consumption"): then the shift in demand curve is simply equal to the change in the money value of consumption or consumption outlay. Therefore his device would simply be equivalent to saying that new investment is correlated with the rate of increase in consumption outlay.

II

STATISTICAL VERIFICATION

7. Depending on the statistical material available, in some cases both aspects—the correlation and the regression aspect—have been tested, whereas in other cases only the correlation aspect could be considered. The regression aspect can only be investigated if figures on the stock of physical capital goods are available and this is only the case for individual branches. The following industries have been taken:

- (a) Railways: U.K., pre-war, chart 1. France and Germany, pre-war, chart 2.
- (b) Cotton spinning: U.K., pre-war, chart 3.
- (c) Shipping: U.K., pre-war, chart 4.

As, however, for business cycle theories the behaviour of industry as a whole is of considerable interest, general indices have also been considered. Here the only possibility seems to be comparing the *production* index of investment goods or durable goods with the rate of increase in the index of consumers' goods production. In many respects this is

a less reliable comparison, as production of investment goods does not necessarily—although probably—fluctuate parallel to new investment. Replacement, which is included also, may show different fluctuations. It will, however, usually show less pronounced changes.

8. The railway charts have been drawn according to the following principle. The dotted line always represents the deviations from trend (nine-year moving averages) of the percentage rate of increase in rolling stock. For each of the countries it has been drawn twice; it has been compared with a full curve which has everywhere been drawn at such a scale as to give the best fit. The upper full curve represents the fluctuations in the rate of increase of traffic, the lower full curve the profit rate (both as deviations from their nine-year moving averages). The upper graph therefore gives “the explanation of new investment by the acceleration principle,” the lower one “the explanation of new investment by the profit principle.” The lag of new investment has been taken $1\frac{1}{2}$ year, except for the profit principle for Germany, where it is 1 year. These lags seem to correspond fairly well to the lags in the curves, and, what is more important, they are about equal to the lag between orders and deliveries found for American figures.

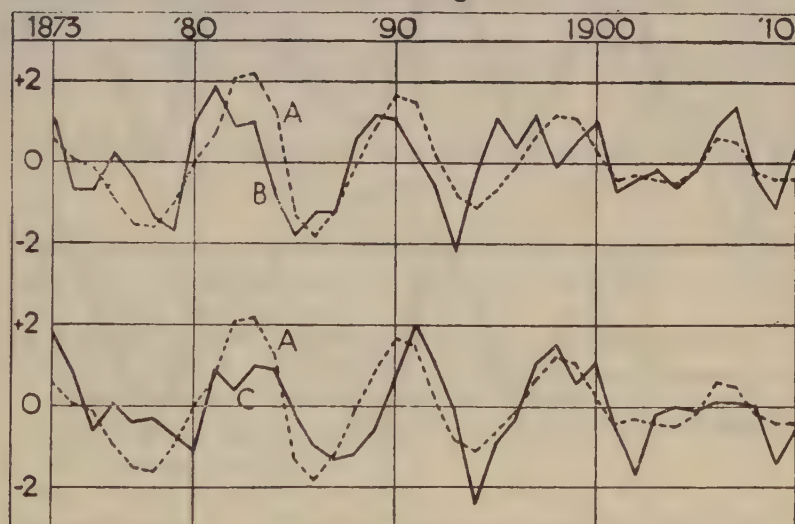


Chart 1.—RAILWAYS, UNITED KINGDOM.

- A. Percentage rate of increase in rolling stock (average of locomotives and cars weighted roughly according to their average prices in a base period).
- B. Percentage rate of increase in traffic, $1\frac{1}{2}$ year before, drawn on such a scale as to yield the best fit with A.
- C. Profit rate, $1\frac{1}{2}$ year before, drawn as B.

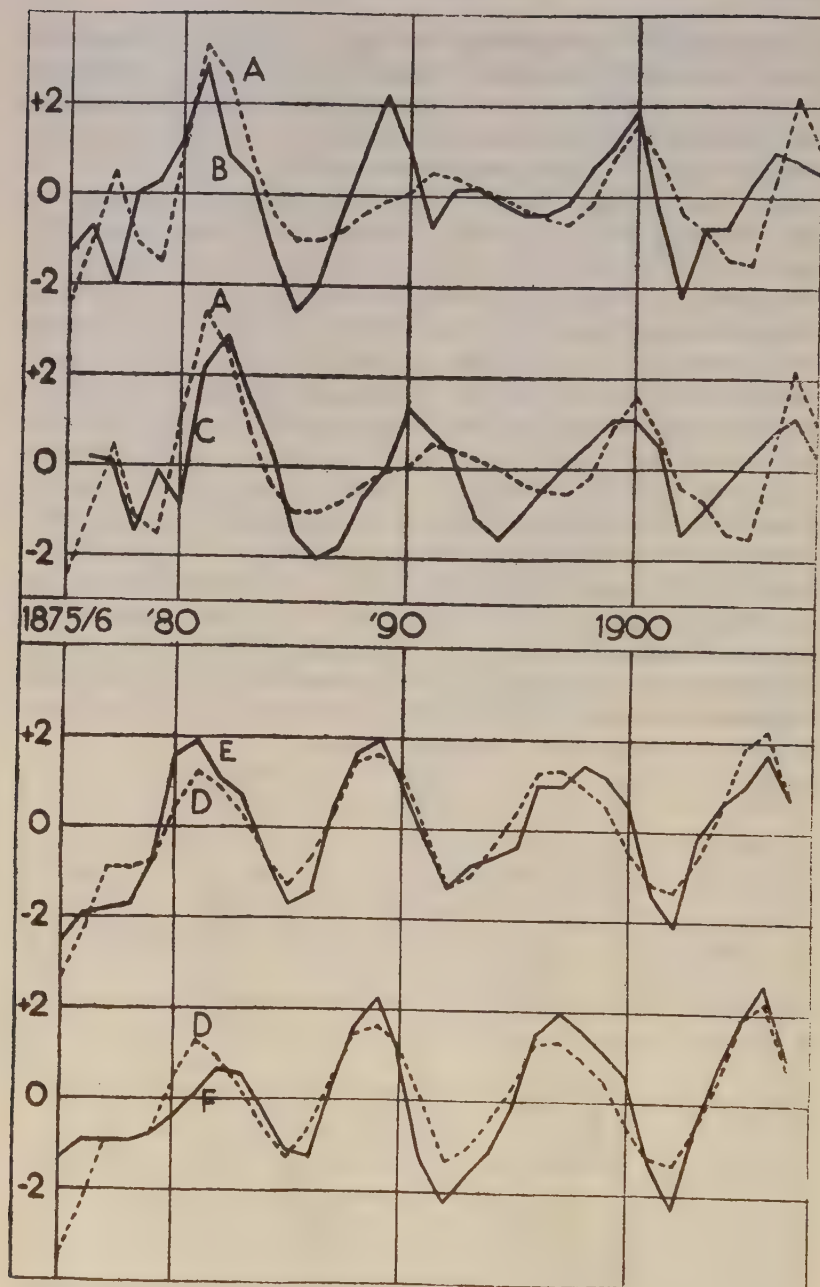


Chart 2.—RAILWAYS, FRANCE (A, B, C) AND GERMANY (D, E, F).

A, D. Percentage rate of increase in rolling stock.

B, E. Percentage rate of increase in traffic (B, $1\frac{1}{2}$ year before; E, $2\frac{1}{2}$ year before), drawn as B in chart 1.

C, F. Profit rate (C, $1\frac{1}{2}$ year before; F, 1 year before), drawn as B.

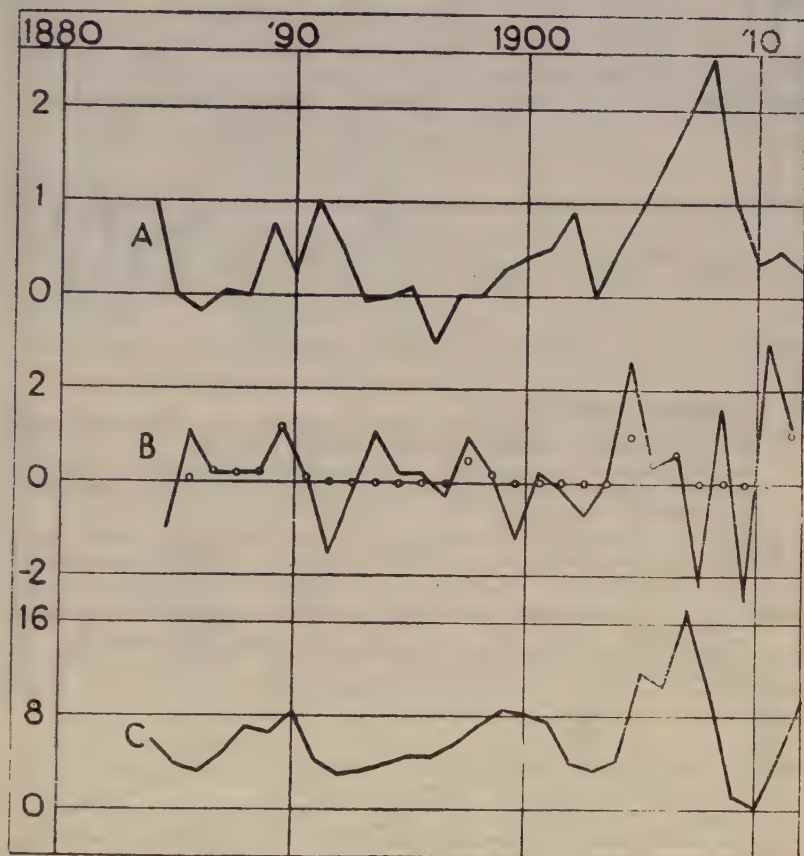


Chart 3.—SPINNING, UNITED KINGDOM.

A. Net increase in number of spindles (millions).

B. Rate of increase in cotton consumption (million cwts).

O. "Corrected curve," i.e., (i) every negative figure replaced by zero, (ii) the subsequent positive figures replaced by zero as long as former maximum in consumption not yet reached again, (iii) the first figure after the former maximum has been surpassed replaced by difference between new maximum and former maximum.

C. Average spinning profits (£1,000.—).

Figures taken from D. H. Robertson, *A Study of Industrial Fluctuations*.

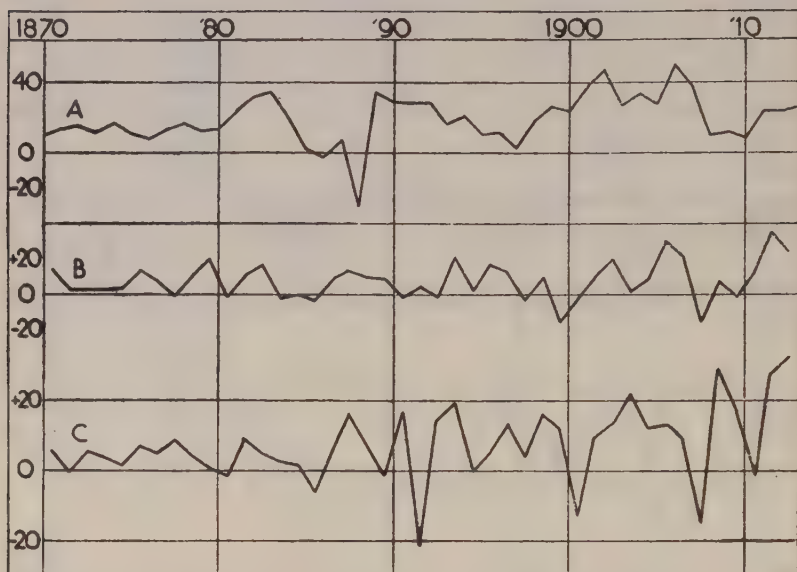


Chart 4.—SHIPPING, UNITED KINGDOM.

- A. Net rate of increase in total tonnage, 10,000 tons (sailing tons counted for one third).
- B. Net rate of increase in total British tonnage entered, million tons.
- C. Rate of increase in "transport index," indicating ton-miles of transport for chief sea transport commodities (cereals, coal, wood, oil, nitrate). Taken from *De Nederlandsche Conjunctuur*, March, 1934).

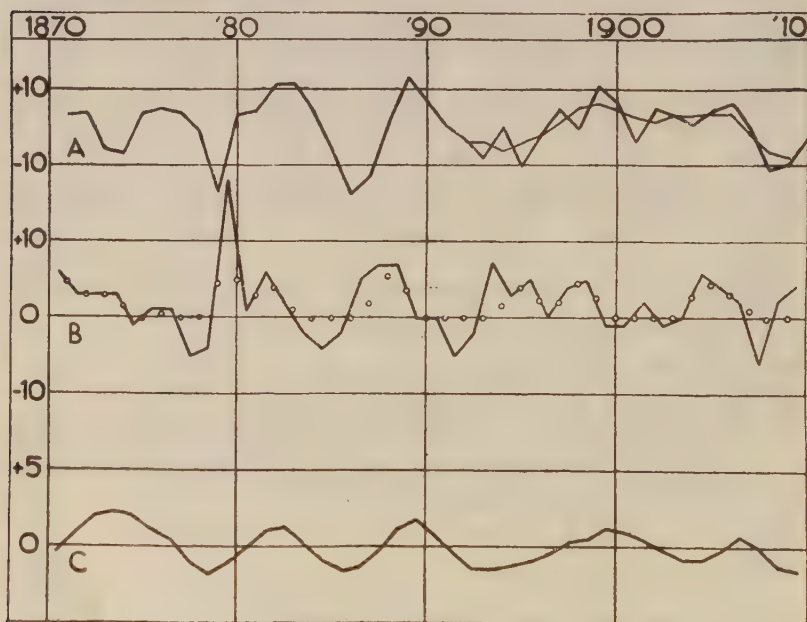


Chart 5.—GENERAL ACTIVITY, UNITED KINGDOM.

- A. Consumption of pig iron, percentage deviations from trend (nine-year moving average); taken account of pig iron in steel, of changes in stocks and after deduction of iron in exports.
- B. Rate of increase in industrial production (O, corrected figures, cf. chart 3, two-year moving averages); Hoffmann's index.
- C. Non-labour income, deviations from trend (Stamp's figures for taxed income).

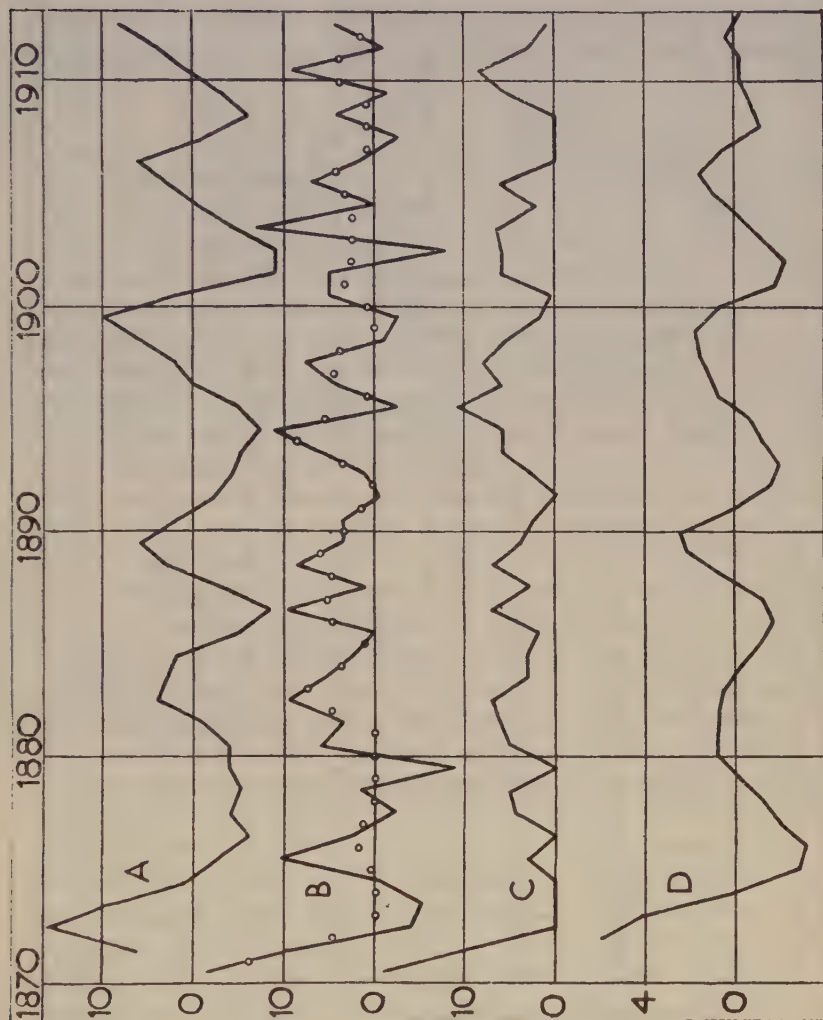


Chart 6.—GENERAL ACTIVITY, GERMANY.

- A. Consumption of pig iron, percentage deviations from nine-year moving average, two-year moving average; taken account of iron in steel and after deduction of iron in exports.
- B. Percentage rate of increase in industrial consumers' goods production (O, corrected figures, cf. chart 3, two-year moving averages).
- C. Percentage rate of increase in total industrial production, corrected figures, cf. chart 3.
- D. Dividends of all societies, percentage of capital, deviations from nine-year moving averages.

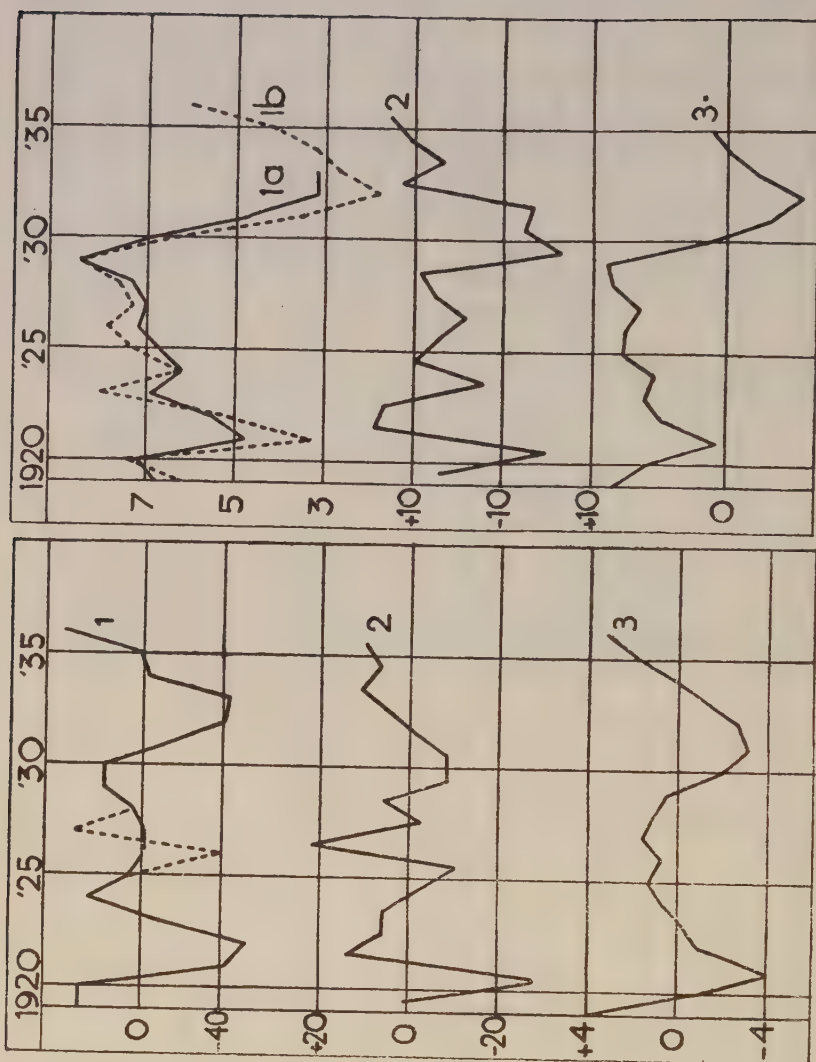


Chart 7.—GENERAL ACTIVITY, U.K. AND U.S.A.

U.K. : 1. Consumption of iron, percentage deviation from rectilinear trend; taken account of iron in steel, iron in exports deducted.

. . . actual figures 1926 and 1927; --- "corrected" figures (corrected for coal miners' strike).

2. Rate of increase in industrial production, 1929=100; before 1928 taken from Hoffmann, since from B.o.T.

3. Profits, percentage of capital, deviations from rectilinear trend; *Economist*.

U.S.A. : 1a. Deliveries of producers' durable commodities, Kuznets, 10^9 \$ of 1929.

1b. Pig iron production in five million long tons.

2. Rate of increase in industrial production, F.R.B., 1923-5=100.

3. Profits of all corporations, 10^9 \$, Stat. of Income.

The scale chosen for the full line in the upper graphs depends on the regression coefficient found for the percentage rate of increase in traffic. According to the acceleration principle in its rigorous form it should be equal to 1; it was, however, found to be for:

U.K.	..	..	..	0.53
France	..	..	..	0.44
Germany	..	..	..	0.48

These figures illustrate at the same time what has been called the regression aspect of the principle. Evidently it only agrees with the less rigorous form given.

As to the correlation aspect, it is immediately seen from the charts that the correlation is only high for the case of Germany (as it was for the U.S.A. during the period studied by Professor Clark¹); for the U.K. and France, however, it is rather low. But the correlations obtained for the profit principle are by no means higher.

It has been tried to improve the correlation by a correction, consisting in two sorts of changes in the figures for the rate of increase in traffic:

(i) putting equal to zero any negative number and the positive numbers following it, as long as the last maximum in traffic has not yet been reached;

(ii) in those years where a previous maximum in traffic is passed again the rate of increase in traffic is reduced to the extent the new maximum surpasses the previous one.

This correction evidently corresponds to the difficulties mentioned under 4 (a).

In the case of railways, however, it works out very little for pre-war times, as years of decrease were seldom. In some of the other cases considered the influence of this correction is far larger.

9. In all further cases the curves have been given separately, the first always representing the investment series, the next curve (or, for charts 4 and 6, two curves) the rate of increase in production (of the goods produced with the help of the investment goods considered) and the lower curve the profits in the industry considered. An exact description has been given with the charts. Sometimes the curve in the middle has been corrected in the way already described; the result is indicated by small circles representing

¹ It was not in the period studied by S. Kuznets: "Relation between Capital Goods and Finished Products in the Business Cycle," *Economic Essays in Honor of W. C. Mitchell*, New York 1935, p. 209.

two year moving averages of the corrected curve, in order to eliminate small and probably meaningless fluctuations.

For cotton spinning and shipping the acceleration principle breaks down completely. No correlation of any importance exists. For cotton spinning, the profit principle works. For shipping no satisfactory profit figures could be found.

Considering the four general cases, where, however, the figures for net investment are not available in any form, I think they are all rather bad for the acceleration principle. One could doubt in the case of the U.K. (pre-war), chart 5, but even there the explanation by the profit principle certainly gives better results ; and in all cases the fit obtained with the acceleration principle would certainly be poor. One has, of course, to be careful with the interpretation of the correlation between profits and investment, which could as well be such that investment determines profits, instead of the other way round. Then the mere fact that their mutual correlation is better than the one required by the acceleration principle would not prove much. There are, however, reasons for believing in the interpretation given¹ and then it seems that a better explanation of investment is possible than the poor one yielded by the acceleration principle.

10. Summarising, it may be said that the acceleration principle cannot help very much in the explanation of the details in real investment fluctuations, with the possible exception of railway rolling stock.² As a rather rough principle with the chief object of explaining the tendency to more intense fluctuations in durable goods production it remains of value ; but that tendency seems to be half as large as would be expected.

¹ These will be given in the report on the League of Nations investigations into the subject.

² Mr. D. H. Robertson draws my attention to the fact that railways have to carry any freight offered and for that reason might react more exactly in the sense of the acceleration principle.

Reflections on the Blum Experiment

By ROBERT MARJOLIN

THE problem discussed in this article is very simple: why has France had nothing worth calling an economic recovery since 1930? Why is she the only country to have passed from one period of depression into another without enjoying an interval of prosperity in the meantime? I shall not carry the analysis beyond the time when the world economy itself began to decline anew. There is nothing surprising in the downward trend of the French economy since the winter of 1937-1938. What does require explanation is the stagnation of her industry and trade during 1936 and 1937. For reasons which will become clear as we proceed, I shall divide the period under discussion into four sub-periods:

- (1) from July, 1935 (the final attempt by the Laval Government to carry out a policy of deflation) to June, 1936 (formation of the Blum Government);
- (2) from June, 1936 to September, 1936 (first devaluation of the franc);
- (3) from September, 1936 to March, 1937 (general enforcement of the forty-hour week Law);
- (4) from March, 1937 to the autumn of 1937 (beginning of the recent decline in world economic activity).

The economic history of these two years clearly cannot be fully discussed in a few pages. My aim is simply to point out its most important features, giving only a brief mention to those which are well-known and undisputed but considering more fully those points which are controversial. In particular, I want to show why the attempts made to restore prosperity during this period proved futile and to refute the view, very widely held, that the Blum experiment failed because its authors, owing to their reluctance to discard orthodox formulas, were not sufficiently bold.

(1) JULY, 1935—JUNE, 1936.

In July, 1935, the equilibrium between French and foreign prices was not far from being re-established. According to calculations which subsequent experience has shown to be correct, the gap was about 9 per cent. A moderate devaluation of around 15 to 20 per cent. would have been enough to start a recovery similar to that which Belgium had been enjoying for some months. But the memory of the post-war inflation and of the collapse of the franc in 1924-1926 was so vivid that no political party dared to propose, and no Government to put into effect, this solution of the problem. On the other hand, the country, and especially the farming population, would not stand further deflation. Hence the Government, faced with a choice of evils, decided on a policy of raising agricultural prices without devaluing the franc. The gap between French and foreign prices widened and the increased prices of farm products led to a progressive rise in the cost of living which weighed heavily upon the workers. This provides at least a partial explanation of the outbursts of May and June, 1936, and of the victory of the Front Populaire.

(2) JUNE, 1936—SEPTEMBER, 1936.

These few months witnessed a quite exceptional state of affairs. The franc was held at the 1928 parity while the Government embarked on a policy of raising wages. The Matignon agreements were followed by a rise in wages, in June, of about 12 per cent. The collective agreements made during the following weeks contained provisions for further wage-increases in the future. The labour costs of entrepreneurs were also raised by the establishment of holidays with pay. The total rise in wage-costs can be estimated at 18 to 20 per cent.

On the basis of an investigation made by the *Institut scientifique de recherches économiques et sociales* at the beginning of 1936, and confirmed by various other calculations, we can conclude that when the Blum Government took office the gap between French and world prices was around 20 per cent. for wholesale prices and 25 per cent. for retail prices. If we take English prices to represent world prices, we find that between June and September, 1936, this gap remained the same for retail prices but rose from 20 to 27 per cent. for wholesale prices. The excess of

retail over wholesale prices remained very large. If we express it by 1.23 for May, it was 1.18 in September.¹

During this period economic conditions rapidly became worse. The volume of manufactured goods exported, corrected for seasonal variations, fell from 79 in May to 74 in October. The index of unemployment, also corrected for seasonal variations, rose from 163 in May to 173 in September. The volume of industrial output fell from 102 in May to 93 in August.²

The course of events during this period is easy to explain. There was a rise in wages not offset by a depreciation of the franc. Anybody wishing to get a true measure of the effects on an economy of a rise in labour costs imposed by legislation should study this period of June to September, 1936. A longer period would not be satisfactory, for after September, 1936, another force was also at work: the franc was continuously depreciating. If we confine ourselves to the period under discussion, the conclusion is perfectly clear: the result was a worsening of the economic situation, as shown by all the available indices.³

(3) SEPTEMBER, 1936—MARCH, 1937.

This period, following the first devaluation of the franc, witnessed a temporary improvement in economic activity. Wages continued to be raised but nevertheless the depreciation of the franc led to a favourable change in French prices relatively to foreign prices. In October, 1936, French wholesale prices were only 3 per cent. above English, and French retail prices had fallen 6 per cent. below English. The index representing the relation between wholesale and retail prices in France, which we used above, fell from 1.18 in September to 1.05 in January.

The volume of manufactured goods exported, corrected for seasonal variations, rose from 74 in October, 1936, to 88 in April, 1937. The index of unemployment, also

¹ These two figures must be considered only in relation one to the other. In no sense do they measure the absolute excess of retail over wholesale prices.

² Great caution should be used in drawing conclusions from changes in the index of production over this period, owing to the effects of holidays with pay. The index of unemployment is much more significant.

³ Neither the strikes nor the establishment of holidays with pay suffices to account for this worsening. The strikes ended in July; while the holidays with pay doubtless kept down the volume of production, they cannot have had any appreciable influence on the extent of unemployment or the volume of manufactured goods exported. But a worsening of the situation is just what we should expect to follow from the widening of the gap between French and foreign prices.

corrected for seasonal variations, fell from 173 in October, 1936, to 143 in April, 1937. The volume of industrial production rose from 93 in August to 99 in November, 1936, and 105 in April, 1937.

Once again, the course of events during this period is easy to explain. French economic activity, helped by the world recovery and stimulated by the depreciation of the franc, experienced a fairly rapid revival. Wages were raised several times, but nothing prevented employers from passing on these increases to consumers in the form of higher prices. The franc fell sufficiently, as time went on, to compensate employers for the rise in their labour costs.

So far, we have found nothing in the least difficult to explain in the results of the Blum experiment. No controversial points have arisen. After September, 1936, France was free from the deflationary pressure exercised by the over-valuation of the franc. A recovery was therefore to be expected, and in fact it came. But why did this recovery end so abruptly at the beginning of the spring of 1937? This is the feature of the whole experiment which most demands explanation, and which we shall therefore consider at some length.

(4) MARCH, 1937—AUTUMN, 1937.

The relation between wholesale and retail prices in France continued to become more favourable. The index representing this relation fell from 1.07 in May to 1.06 in June, 1.03 in July, and 1.02 in August. It will be remembered that French wholesale prices had been above foreign wholesale prices (compared at the current rate of exchange). This unfavourable situation was now reversed, and in July, 1937, there was a favourable margin (that is, an excess of foreign prices over French prices) of 12 per cent. The corresponding favourable margin for retail prices was 17 per cent.

It is true that the French indices of prices probably underestimate the extent and rapidity of the absolute rise of French prices. Nevertheless we may safely conclude that (except possibly in the textile and certain other industries) the disadvantage which the French economy had suffered, in that French prices exceeded world prices, had completely disappeared.

Moreover, once the devaluation of the franc had made recovery possible in France, this recovery should have been assisted and hastened by the fact that, while countries like the United States and Great Britain had begun their economic revival internally with foreign trade at a low level, imports and exports were increasing everywhere in 1936 and 1937. Given the favourable relations, which we stated above, between French and world prices, France should have benefited from this revival of international trade.

Finally, 1936 and 1937 had been years of rapid inflation. Ever since January, 1936, the French Government had constantly increased the quantity of money in order to cover its budgetary deficits. During these two years the Government had borrowed no less than 32 milliard francs from the Bank of France.

Despite this array of favourable influences it is beyond doubt that the recovery which followed the devaluation of September, 1936, came to a sudden stop in the spring of 1937. The volume of manufactured goods exported fell from 88 in April, 1937, to 81 in November, and the index of unemployment, corrected for seasonal variations, remained steady at 143. The volume of industrial production fell from 105 in April to 100 in October, but if we allow for the effects of holidays with pay we may say that this also remained steady during this period.

WAS THERE TOO LITTLE INFLATION ?

How can we explain this striking contrast of a sudden check to economic revival in the spring of 1937 when conditions seemed eminently favourable to recovery ?

It may be suggested that it was because the State did not provide an adequate stimulus. It is true that between January and June, 1937, the Government ceased borrowing from the Bank. And although they recommenced, and on a larger scale than before (notably in June and September), most of this renewed inflation was offset by the deficit in the balance of payment on income account. Can it be, therefore, that the economic indices stopped rising in March-April, 1937, because the Government put the brake on the issue of bank notes ?

In fact, there is nothing in this suggested explanation. During the years 1936 and 1937, the French economy was under the shadow of political and monetary insecurity,

resulting in heavy exports of capital. On numerous occasions the value of the capital exported was equal to the value of the extra notes which had just been issued. A new franc put on the market was a franc which was promptly exchanged for sterling or for the money of some other country with a relatively stable political and monetary régime. In 1936 and 1937 no less than 32 milliard Auriol francs left France.¹ Over this period the French Government borrowed 32 milliard francs from the Bank. It will be noted that these two figures are exactly the same.

It would seem, therefore, that the inflation had no direct influence on economic activity. Nor would a larger increase in the note issue have had any more effect. It would merely have brought about a greater export of capital, largely in the form of gold, and a more rapid fall in the exchange-value of the franc.

Indeed, in so far as the inflation had any influence on activity, it had an unfavourable influence. For a budget in a state of chronic disequilibrium, a Treasury which needed to spend sums not covered by normal revenue and amounting to nearly as much as its ordinary expenditure (in 1937, the Government spent 86 milliard francs, of which 42 milliard were provided by inflation and borrowing), the prospect of a growing gap between the needs of public authorities and their receipts—all this both led to the export of capital and prevented the return of capital which had left the country during the preceding years, having been taken from the national savings, and which was absolutely indispensable to an economic recovery. Finally, the deplorable state of the public finances exerted a pernicious effect on economic activity in that it compelled the Government to borrow at ever-increasing rates of interest, the bulk, if not the whole, of the national savings. Thus in 1929 total new issues of capital by companies, less repayments, amounted to 21,713 million francs; in 1936 the corresponding figure was only 2,040 million francs. On the other hand, whereas the Government, the railways, and public bodies had repaid 2,414 million francs in 1929, they borrowed 13,530 million francs in 1936. In 1937, the increase in Government debt alone was 42 milliard francs. If we subtract from this

¹ Since the departure from the gold standard and the creation of the Exchange Equalization Fund, francs which are offered on the market are bought by the Fund (when it refuses to let the national currency fall) and put into its account at the Bank of France.

figure the increase in the loans made by the Bank of France to the Government and the sums devoted to the amortisation of the debt, there nevertheless remains an increase of some 30 milliard francs. The great bulk of this increase represents the contribution made by the national savings to cover the budgetary deficit. In the course of this same year, 1937, the total volume of new issues by companies, even without deducting repayments, did not exceed 3.6 milliard francs.

THE FORTY-HOUR WEEK.

It seems, then, that the persistence, or, rather, the recrudescence, of distrust in the stability of the franc, after some weeks of confidence, affords a partial explanation of the check to recovery in the spring of 1937. But it does not afford a complete explanation. Let us suppose that the Government had made a great effort to cut down its budgetary expenses and had thereby succeeded in removing the fears of all creditors holding debts in terms of francs. Let us further suppose that either :

(1) the return of large amounts of capital had led to a fall in the rate of interest, so that investments hitherto unprofitable could now be made, public borrowing weighing less heavily than before on the market for savings; or

(2) by some means or other the Government had put a large amount of means of payment on the market, without the newly-created francs being exported, and that this had led to a reduction in the rate of interest, opening up wider fields for profitable investment.

Or, yet again, let us suppose that the Government, having failed to remove the fears of creditors, had imposed a rigid system of exchange control, behind which it had embarked on a large-scale inflation.

Upon any of these hypotheses a continued recovery would have been theoretically possible. But would it have taken place? No. For, paradoxically enough, the French economy found itself in the beginning of 1937, after a recovery of some weeks, in a situation in which *all the available labour was being completely utilised*. The striking feature of this fourth period, March–Autumn, 1937, is that *with a volume of production not appreciably above the lowest level reached during the depression, France suddenly found herself in a state of full employment*. There is nothing mysterious about this. The first months of 1937 were precisely the time when

the provisions of the forty-hour week Law, passed in June, 1936, under the pressure of the working classes, were being applied indiscriminately and at an increasing rate.

They began to be applied at the close of 1936. The figures of employment in establishments with more than 100 workers show that as early as the beginning of February, 1937, 1,408,988 workers had been brought under the régime of the forty-hour week as against 781,511 who had not. The corresponding figures are 1,480,744 and 731,646 for March, 1,757,369 and 465,485 for April, 2,094,860 and 133,402 for May, and 2,200,406 and 40,873 for June. Thus the length of the working week had virtually been reduced to forty hours throughout the whole of French industry by the beginning of May, 1937.

At one stroke, partial unemployment—that is “short time”—was almost completely wiped out. The proportion of workers at work for less than the full legal maximum working week (in establishments with over 100 workers) fell from 30.7 per cent. in December, 1936, to 7.4 per cent. in January, 1937. It rose again to 11.7 per cent. in February and 12.5 in March, but it fell again to 3.9 per cent. in April. This elimination of partial unemployment resulted from a two-fold influence of the forty-hour week Law:

(1) Workers who had previously been employed for less than 48 hours but for 40 hours or more and had therefore been included among those partially unemployed were now recorded as fully employed;

(2) Workers who had previously been employed for less than 40 hours were now employed for 40 hours in order to compensate for the reduction in the work done by workers who had previously been employed for more than 40 hours.

In any event, the manner in which the phenomenon of full employment came about is of little importance. The truth is that at the beginning of 1937 those workers already in employment were working for the maximum time legally permitted. But, it will be asked, did not the unemployed constitute a reserve of labour sufficient to provide the labour market with that elasticity which it needs if the volume of production is to expand?

This question brings us to the fundamental error which vitiated the whole of the Blum experiment. The essential aim of this experiment was to re-absorb the unemployed. The raising of wages, the reduction in the length of the

working week, and many other measures, had as their principal, if not their sole, aim to reduce the number of workers who had no work. Now, the fact is that France has never had an unemployment problem. At any rate, it has never been anything like as serious as in Great Britain or the United States or Germany. The maximum number of unemployed receiving public assistance was 487,000 (in February, 1936). It is true that the French system of unemployment assistance is very defective, so that the *chômeurs secourus* are only a part of the total of unemployed workers. But the population census of March, 1936, gives us an exact figure for the total, namely 823,000. This is only about 4 per cent. of the total working population, as compared with a maximum of more than 15 per cent. in England during 1932.

In any event, the number of unemployed receiving assistance fell in the course of 1937 to a number varying between 300,000 and 400,000, despite the growing scope of unemployment assistance. As it is probable that the non-assisted unemployed were the first to become reabsorbed into employment, the grand total of unemployed at the beginning of 1937 can hardly have exceeded 400,000 or at most 500,000. This figure is relatively low. Nevertheless it is probable that it would have been considerably lower had the capital-goods industries been able to expand freely. But it is well known that there was no reserve of skilled workers competent to be employed in these industries, partly because no apprentices had been taken on during the depression and partly because of the sudden reduction by 17 per cent. in the length of the working week.

The decisive proof of the part played by the reduction of the working week in the check to economic revival in the spring of 1937 has been provided by the inquiry into production carried out during the second half of that year. This inquiry showed that during the first half of 1937 a large number of industries found themselves unable to carry out all the orders which they received. The main industries in this situation were: coal mining, iron and steel (especially as concerns special steels), aluminium, mechanical construction (notably machine-tools and plant and equipment), and the motor industry. Moreover, at the moment when the final report of the inquiry was written, a number of industries were working at full capacity and the demand

for their products could readily have been increased. These included the non-ferrous metal industries (aluminium excepted), foundries, electrical equipment, ship-building and metal containers.

We can now explain without difficulty what happened in the spring of 1937. The devaluation of September, 1936, set the stage for an economic expansion, which commenced by a rapid revival in the production of capital-goods. Normally this would have been followed by an expansion in the output of consumption goods, stimulated by the purchasing-power distributed by the capital-goods industries. But the reduction in the length of the working week created an artificial scarcity of workers in the latter industries and thereby made the recovery abortive.

SOME COMMENTS ON A RECENT ARTICLE.

Whilst the above was being written, a very interesting article by Mr. Kalecki on "The lessons of the Blum experiment" appeared in the March number of the *Economic Journal*. Mr. Kalecki's remarks on, for example, the changes brought about by the Blum experiment in the distribution of income among the different classes of the population seem to me perfectly true. Nor do I wish to discuss whether or not the theories of Mr. Keynes have been confirmed by events in France over the last two years. But I find myself quite unable to give the least approval to the method adopted by Mr. Kalecki to analyse these events or to the conclusions which he reaches. The reasons for my attitude will be quite clear to those who have read the preceding pages.

I think that the main argument of Mr. Kalecki can quite fairly be summarised as follows :

A. The external influences (the deficit in the balance of trade and monetary inflation) operating on the French economy during the Blum experiment more or less neutralised one another. The rate of interest remained comparatively stable and the price of labour and of raw materials rose by some 60 per cent. Hence "the Blum experiment enables us to investigate the consequences of the rise of money wages in a closed system with the rate of interest kept constant." In order to carry out this investigation, let us compare the various economic indices for April, or March to May, 1936, with those for April, or March to May, 1937.

We find that the wholesale prices of industrial goods rose during this period to the same extent as wages and the prices of materials—namely, by 60 per cent. The volume of production, however, showed little change. This demonstrates “that the rise of wages in an isolated system tends to change prices in the same proportion, and not to affect the output.”

B. Nevertheless there was a slight rise, of about 3 per cent., in the volume of production between these two dates. This must be attributed to the inflation which took place (or rather to the excess of the increase in the note issue over the deficit in the balance of trade). The rise was only of the order of 3 per cent. because the amount of inflation was insufficient. “To stimulate business activity appreciably a much greater deficit was needed.” But this would have necessitated exchange control. “In order, however, to go forward with the stimulation of production by budgetary deficit, the Blum Government needed a basis which they failed to secure from the very beginning: the exchange restrictions.” For, “the vulgar theory according to which the deficit—in particular when financed by the central bank—is an immediate peril to the currency, is deeply rooted among French economists, bankers and rentiers.” The failure of the experiment was due to hesitation between the two conflicting aims of stimulating the economy and reducing the budgetary deficit. The seal was set on this failure by “the return to an orthodox financial policy.”

My criticism of Mr. Kalecki is threefold. It concerns (1) his method; (2) the arguments summarised above under *A*; and (3) those summarised above under *B*.

(1) In my view, it is a great mistake to appraise a series of events as complex as those which took place during the Blum experiment by comparing the situation at two points of time, the one at the beginning and the other at the close of the experiment (or the point which Mr. Kalecki considers as the close of the experiment), without taking account of what happened in the meantime. This method is particularly open to criticism in that Mr. Kalecki, having chosen April, 1936, as his first point of time (a choice which can be justified on the ground that June, 1936, when the experiment in fact began, was a month of serious strikes) thought it essential to take as his second point of time, for purposes of comparison, April, 1937—when the experiment was in

full swing and the forty-hour week Law had only just been applied at all fully.

Even apart from this, in order to measure the results between April, 1936, and April, 1937, of the various measures taken by the Blum Government it is absolutely essential to study the course of the various economic indices throughout the whole of this period. If this is not done, two quite different things will be confused with one another. We have seen that between June and March-April, 1937, two different experiments were made. From June, 1936, to September, 1936, the state of trade in France was dominated by a rise in wages side by side with an over-valued franc. From September, 1936, to March-April, 1937, on the other hand, the first devaluation of the franc was exerting its influence. How can one make a single appraisal of these two dissimilar, not to say opposite, experiments? Mr. Kalecki notes that between April, 1936, and April, 1937, the volume of production rose by 3 per cent. In fact, this rise was the result of a fall of 9 per cent. between April and August, 1936, and a rise of 13 per cent. between August, 1936, and April, 1937. If we chose to use an index from which seasonal fluctuations and the direct effects of holidays with pay are eliminated, such as the index of unemployment, we should find that it rises 6.1 per cent. between April and September, 1936, and falls 17 per cent. between September, 1936, and April, 1937. But since unemployment was influenced by the application of the forty-hour week, we may content ourselves with the adjusted volume of manufactured goods exported as indicating the situation of one part of the French economy. From April, 1936, to September, 1936, this index fell by 8.7 per cent.; from September, 1936, to April, 1937, it rose by 13 per cent. It is true that the worsening of the situation before September, 1936, was due not only to the rise in wages without any devaluation of the franc but also to social unrest and to the difficulties of adjustment inevitably caused by the application of the law providing for holidays with pay.¹ But this makes little difference to the argument. The essential point is that the period examined by Mr. Kalecki embraces two quite distinct experiments, affecting the economic indices in quite contrary directions. Hence a single figure relating to the whole of the period is without significance.

¹ We have explained above why the worsening of the situation before September, 1936, cannot be considered as due solely to the strikes and to holidays with pay.

(2) Mr. Kalecki believes that the Blum experiment provides a verification of the thesis of Mr. Keynes that a rise in wages in a closed system, the rate of interest remaining the same, has as its sole effect a corresponding rise in selling-prices. I do not in the least wish to make any pronouncement either for or against this thesis of Mr. Keynes. I wish only to point out that Mr. Kalecki has not the slightest justification for drawing any conclusion whatever concerning this thesis from what has occurred in France during the last two years. For during this period the French economy did not form a closed system in any sense. The fact that the increase in the volume of notes, issued to cover the budgetary deficit, may equal the deficit in the balance of payments does not suffice to make France a closed system. For we cannot possibly leave out of account the violent movements in exchange rates and in the export of capital, the fluctuations in the various elements of the balance of payments, which took place in the course of the twelve-month period considered by Mr. Kalecki.

Indeed, we have seen that it was the very changes in French (gold) prices relatively to world (gold) prices which accounted for the state of trade in France up to March-April, 1937. The reason why the position became worse between June and September, 1936, was that, with French prices already 20 to 25 per cent. above foreign prices, costs of production were raised and the exchange value of the franc was not reduced. An opponent of Mr. Keynes's theory might claim that this first experiment shows that every increase in wages produces an economic recession. But he would be wrong, exactly as Mr. Kalecki is wrong in drawing the opposite conclusion from the experiments carried out between June, 1936, and April, 1937.

The set-back to production during June to September, 1936, was reversed in the following months, so that April, 1937, shows an increase of 3 per cent. over April, 1936, but this reversal was due solely to the depreciation of the franc and the fall of French (gold) prices to a level at which they were not subjected to deflationary pressure from foreign prices and at which French industries could compete against their foreign rivals. We hope that we have already shown this sufficiently clearly and that we need not repeat our argument. But it passes our comprehension how Mr. Kalecki can consider as a closed system an economy whose

development, during the period in question, can be explained only in relation to the level of world prices.

(3) I come now to what I consider the most important point of Mr. Kalecki's article, namely the general lessons which he draws from the Blum experiment. According to him, the Blum experiment failed because the French neither wished to inflate sufficiently nor knew how to do so. May I be permitted one preliminary observation? Neither Great Britain nor Belgium, both of whom succeeded in bringing about an internal recovery before France attempted to do so, had any need to resort to inflation. Neither Holland nor Switzerland, who devalued their currencies in September, 1936, at the same time as France, found it necessary, in order to stimulate a recovery, to use any methods other than those of strict budgetary orthodoxy.

Mr. Kalecki reproaches French economists, bankers and rentiers for continuing to adhere to the "vulgar theory," according to which the budget deficit, above all if it is financed by the Central bank, constitutes an imminent threat to the currency. It would be easy for me to reply to Mr. Kalecki that the psychological reactions of the various social groups which make up a country must be included in the data of which we have to take account, just like schedules of wants, the scarcity of resources, and all the other given conditions of economic activity. But I think that a still more decisive objection can be made to his theory.

Mr. Kalecki blames the Blum Government for not instituting exchange control. I say nothing of all the difficulties inherent in this plan, and notably of whether it could have worked within the institutional framework of the French economy. I shall suppose that complete exchange control had been applied, or rather let us say, in order to reduce the extrinsic difficulties of our problem to a minimum, that the French people had been persuaded that a large-scale inflation was not a threat to their currency. Suppose, then, that such an inflation had taken place. What would have happened?

It is not difficult to answer this question. The forty-hour week Law had created, at any rate in the capital-goods industries, a state of full employment. The labour market had lost all elasticity. Prices would have soared upwards

without any increase in the volume of production. I cannot conceive how Mr. Kalecki has been able to omit the effects of the forty-hour week Law from his appraisal of the Blum experiment. He speaks of it as if it were something quite incidental to which he attaches little importance. To my mind, on the other hand, the reduction in the length of the working week was the dominant factor of the whole experiment. It was that which, in the spring of 1937, stifled the revival which had been going on for some months.

* * *

To sum up, an economic revival would have been possible in France in July, 1935, provided that a moderate devaluation had been made. Instead of that, a policy of raising agricultural prices was adopted.

A somewhat larger devaluation would have re-established equilibrium between French and foreign prices in June, 1936. Instead of that, wages were artificially raised and the franc was left unchanged. The result was a marked fall in the economic indices from June to September, 1936.

Then at last, because it was almost unavoidable, the franc was devalued and continued to depreciate during the months which followed. The state of trade improved. For several months the volume of production increased. But the legal length of the working week was reduced at one blow by 17 per cent. at the close of 1936 and the beginning of 1937. The possibilities of further expansion were thereby destroyed owing to the consequent shortage of skilled labour. The result was a stagnation of economic activity during the greater part of the year 1937.

In December, 1937, under the influence of world conditions, France began a new period of recession in her industry and trade which still continues at the moment of writing these lines.

The End of the Marginal Utility Theory ?

By H. BERNARDELLI

I

Recent inquiries into the theory of value have made it appear doubtful whether the marginal utility concept provides a suitable basis for economic theory. The way in which this concept has been used in mathematical economics so far, it is contended, is incompatible with the fact that utility being an intensive, psychological magnitude cannot be subjected to any form of measurement. The theory of value, it is claimed, has to be reconstructed so that no doubt is left as to the fundamental immeasurability of total and marginal utility, and if it should turn out that either of these two concepts, or both, cannot be fitted into the reshaped framework, it is concluded that they must be eliminated as "meaningless" and "unscientific."

The argument is old and has been brought forward ever since mathematical economics came into existence. But whereas originally this opinion has been voiced only by writers who did not belong to the camp of marginal utility theorists, by outsiders so to speak whose anti-mathematical bias made them blind to the success the marginal utility theory could claim in all branches of economic inquiry, lately a complete change in the situation has taken place. The argument has found its way into the friend's camp itself, it is now being taken up by authors who properly belong to the camp of mathematical economists. Weighty mathematical reasons have made them doubt that marginal utility is a legitimate concept. No longer can the argument be brushed aside as irrelevant prejudice, the crisis has developed from within. It is a curious process of a self-decomposition of a theory—a supreme example of Hegelian dialectics, if one likes—which not so long ago had been hailed as the essential step in putting economics on a scientific basis.

To make it more perplexing this development has originated

from Pareto's ingenious attempt by means of his index theory of utilities to provide for the marginal utility theory a firm and scientific basis which was unassailable by any of the arguments of the 'économistes littérateurs', as he called them contemptuously. His idea, it will be recalled,¹ was this: If $I_1, I_2, I_3, \dots$ be the utilities of certain combinations of goods $X, Y, Z, \dots$ which as motives or impulses of an individual are the essential factors that determine his choice it would be possible to introduce these immeasurable psychological magnitudes into the equations of equilibrium if one correlated them with "indices of utility" by means of the following postulate:

Postulate I: The utility index function being $\phi(x, y, z, \dots)$ where $x, y, z, \dots$ are the amounts of the commodities $X, Y, Z, \dots$ in possession of the individual and $x_1, y_1, z_1, \dots$ and $x_2, y_2, z_2, \dots$ being two combinations compared by the individual we shall have

$$\phi(x_1, y_1, z_1, \dots) \gtrless \phi(x_2, y_2, z_2, \dots)$$

according as to whether the utility derived from $x_1, y_1, z_1, \dots$ is greater, equal to, or less than the utility derived from $x_2, y_2, z_2, \dots$.

However, the choice of the index function ϕ would have to be completely arbitrary because utility is an immeasurable quality which can be only subjected to comparisons as regards magnitude. Any index function $F(\phi)$ —which only fulfils the condition $F' > 0$ —would do the same service. If $I_1 > I_2 > I_3 > \dots$ were indicated by the relation $\phi_1 > \phi_2 > \phi_3 > \dots$ the same would be achieved by $F(\phi_1) > F(\phi_2) > F(\phi_3) > \dots$, the transformation F leaving the order of magnitude of the indices of utility invariant.

For many of its deductions, however, mathematical economics uses a second postulate:

Postulate II: $x_1, y_1, z_1, \dots, x_2, y_2, z_2, \dots$ and $x_3, y_3, z_3, \dots$ being three combinations of goods compared by the individual we shall have

$$\begin{aligned} \phi(x_2, y_2, z_2, \dots) - \phi(x_1, y_1, z_1, \dots) &\gtrless \\ \phi(x_3, y_3, z_3, \dots) - \phi(x_2, y_2, z_2, \dots) \end{aligned}$$

¹ The ideas of Pareto have become common property by now so that I need not give detailed references. Out of the great literature to the point I should like to mention only three contributions which appear to be especially useful in this connection: A. L. Bowley, *Mathematical Groundwork of Economics*, Oxford, 1924, Introduction; O. Lange: "The Determinateness of the Utility Function," *Review of Economic Studies*, Vols. I and II, 1934 —and a discussion of this article in the same journal with contributions of E. A. Phelps-Brown, R. G. D. Allen, O. Lange and myself,

according as to whether a transition from the combination $x_1, y_1, z_1, \dots$ to $x_2, y_2, z_2, \dots$ involves a change of utility greater, equal to, or less than a transition from combination $x_2, y_2, z_2, \dots$ to $x_3, y_3, z_3, \dots$.

But this postulate seems to limit seriously the free choice of equivalent functions $F(\phi)$ as indices of utility because with $\phi_3 - \phi_2 > \phi_2 - \phi_1$ one would not have in general $F(\phi_3) - F(\phi_2) > F(\phi_2) - F(\phi_1)$. Only if one would restrict the choice of $F(\phi)$ to functions of the type $F'' = 0$ the two relations would be fulfilled simultaneously.

Using the second postulate thus imposes a very serious restriction upon economic theory, because to subject the choice of the utility index function to the condition $F'' = 0$ is equivalent to treating utility as if it were measurable.¹ Such a utility function namely could be used as a measure of utility in the same way as extensive scales are used in physics for measuring "indirectly" intensive magnitudes such as heat. There seem to be thus only two ways open for mathematical economics. *Either* one could try to retain the second postulate by establishing a case for indirect measurement of utility *or* one could eliminate it from economics giving up as "meaningless" all those propositions which depend in their validity on this assumption.

The Paretian school has, up to now, pursued the second course. Their method has the distinct drawback of restricting what this school considers as "legitimate" in economics to the very narrow range of the equilibrium mechanism pure and simple; it is particularly disastrous for the marginal utility theory in the wider sense which, if their programme be carried out, would be simply exterminated. This was first discovered in examining the Edgeworth-Pareto criterion of complementarity of goods.² It is known that these two authors have drawn the distinction between complementary and rival goods according as to whether $\frac{\partial^2 \phi}{\partial x \partial y} \gtrless 0$.

But this criterion is not invariant, because if one chooses any other utility index $F(\phi)$ the question whether

$$\frac{\partial^2 F}{\partial x \partial y} = F' \frac{\partial^2 \phi}{\partial x \partial y} + F'' \frac{\partial \phi}{\partial x} \frac{\partial \phi}{\partial y}$$

¹ For explicit proof see O. Lange, *loc. cit.*

² J. R. Hicks and R. G. D. Allen: "A Reconsideration of the Theory of Value," *Economica*, May, 1934.

is greater, equal to, or smaller than zero hinges essentially on the properties of F'' . Only for $F'' = 0$, i.e., in the case of measurability, would there be a general correspondence between the criterion $\frac{\partial^2 \phi}{\partial x \partial y}$ and $\frac{\partial^2 F}{\partial x \partial y}$. Hence it has been concluded that "the Edgeworth-Pareto definition is not adequate for the distinction of relations between a pair of goods and must be rejected in any precise theory of individual choice."¹

But the consequences of this course would be still more radical. Practically all the most lucid explanations of the marginal utility theory use second derivatives of the utility function and appear thus to be dependent on the validity of the second postulate.² The so-called Gossen law, e.g., that marginal utility decreases with an increasing stock of goods in possession of a person, finds its mathematical representation in the condition $\frac{\partial^2 \phi}{\partial x^2} < 0$ which is open to the same objection.

The trouble is this: if $I_1 < I_2 < I_3 < \dots$ be an increasing series of total utilities and $I'_1 < I'_2 < I'_3 < \dots$ an increasing series of marginal utilities it would be possible to represent the total utilities by means of an index ϕ so that one has $\phi_1 < \phi_2 < \phi_3 < \dots$ and $F(\phi_1) < F(\phi_2) < F(\phi_3) < \dots$ simultaneously, but one could not obtain at the same time $\phi'_1 < \phi'_2 < \phi'_3 < \dots$ and $F(\phi'_1) < F(\phi'_2) < F(\phi'_3) < \dots$ where ϕ' and F' stand for the marginal utilities which are represented by the first derivatives of ϕ and F . Arbitrary choice of F does not leave the order of magnitude of the marginal utility indices invariant. Hence it would seem that any statements involving comparisons of marginal utilities as regards their magnitude are rendered meaningless so that practically the whole marginal utility theory has to be eliminated from economics.³

¹ Hicks and Allen, l.c., p. 197.

² A survey of those parts of economic theory which depend on the second postulate the reader will find in Bowley's book, l.c., pp. 13, 15, 55.

³ Cp. Hicks and Allen, l.c., p. 55: "The theory of value does not need any precise definition of marginal utility. What it does need is only this; that when an individual's system of wants is given . . . we should know his marginal rate of substitution between any two goods. The marginal rate of substitution of any good Y for any other good X is defined as the quantity of good Y which would just compensate him for the loss of a marginal unit of X It will be evident to the reader that this marginal rate of substitution is nothing else than what we have been in the habit of calling the ratio of the marginal utility of X to that of Y ; we might have called it the relative marginal

The alternative to retaining the second postulate does not seem to be very hopeful either. There is reason to believe that the nature of psychological intensities is such that—not to speak of direct measurement—even indirect measurement by means of a utility index function cannot be accomplished. It is true that in comparing different degrees of utility as regards their intensities, say I_1 , I_2 and I_3 , we find in our observation more or less dimly associated what could be called a “feeling of contrast” which enables us to gauge to a certain extent whether I_1 is more, or less, distinct from I_2 than I_2 from I_3 . But experience shows that such judging of degrees of unlikeness by means of the sense of contrast is very limited in range and uncertain in accuracy. As psychologists have shown it will be in general hardly possible to obtain a satisfactory estimate of the degree of unlikeness between a pair of intensities I_1 and I_2 and another pair I_3 and I_4 if I_2 and I_3 themselves differ very much from each other.¹

The fundamental difficulty in such cases is that there is no means of testing whether our estimate is correct or not. It is entirely different with those comparisons of utility which are required for the first postulate, because here we are in possession of a criterion which in cases of doubt unambiguously allows decision as to which of two utilities actually is the greater one. We only need to imagine or to create a situation in which we have to choose between them, the satisfaction of the one utility excluding the satisfaction of the other. According to the economic principle it will be the stronger of the two that will be preferred.² But whereas in comparing utilities we can force ourselves

utility. (However,) once we introduce marginal utilities, then, with the best will in the world, it is extraordinarily difficult to keep these two marginal utilities together; they have an almost irresistible tendency to wander apart. . . . We should have to keep a strong hold on ourselves, or we should soon be finding some indirect way of talking about one marginal utility by itself—or, what is equally indefensible, talking about the ratio of the marginal utility of X (when one set of quantities is possessed) to the marginal utility of Y (when the quantity possessed is in some way different).”

¹ The experiments are well known which demonstrate that the feeling of contrast enables us easily to decide that the difference in heat sensations caused by water of 0°C . and 20°C ., say, is greater than the difference corresponding to 20°C . and 21°C .; but it leaves us at a loss in deciding, e.g., whether the difference in temperature of 20°C . and 21°C . is felt as greater, smaller than, or equal to the difference between 30°C . and 31°C . In the case of gauging different degrees of contrast between various intensities of wants the situation seems to be exactly the same.

² The reader should be warned here not to mistake the economic principle as a tautology. Jevons was mistaken (cp. *Theory of Political Economy*, 4th ed., pp. 12 *et sequ.*) when he gave his approval to Alexander Bain's opinion that “it is only an identical proposition to affirm that the greatest of two pleasures, or what appears as such, sways the resulting

to lay their intensities, so to speak, side by side there is no such possibility in estimating different degrees of unlikeness between various intensities. Here we have no criterion which would enable us in cases of doubt to come to a decision but we are left entirely at the mercy of our fluctuating attention which tends to make the results of our observation too arbitrary to be of much use.

The argument which is sometimes brought forward that the economist, in trying to grade his scales of utility according to the second postulate, follows only the practice of the physicist in measuring, e.g., temperature decidedly misses the point. The gradation of the scale of temperature is by no means chosen according to the contrasts between different degrees of heat which an observer perceives but it is based on quite different physical points of view. Any attempt to make the scale of temperature dependent on the sense of contrast of different observers would introduce an element of insecurity into physics that could not be tolerated.

The economist could grade his utility scales only if he were in a position to gauge contrasts between different degrees of utility in a similar *certain* way to his decision in a situation of choice whether one desire is stronger than another. But since he is not there appears to be no reason whatsoever for restricting the arbitrary choice of utility index functions. It would be distinctly hazardous to erect the structure of economics on such insecure grounds as required by the second postulate and it cannot seriously be disputed that Pareto was fundamentally right when he formulated what is called in what follows the postulate of index invariance: Any law in economics must be formulated in a way that it is not affected by arbitrary choice of the utility index function.

Does this mean that economics has to go the way of the Paretian school with all its bitter amputations? That the

action; for it is the resulting action that alone determines which is the greater." The intensity of a desire is a phenomenon that occurs in our psychological experience quite independent of the phenomenon of decision and action. Not all desires lead to actions, nevertheless they do occur with a certain intensity. The economic principle—as every law of nature—is therefore a synthetic proposition. (Cp. my article: "What has Philosophy to Contribute to the Social Sciences, and to Economics in Particular?" *ECONOMICA*, 1936.) This is not altered by the fact that observation of intensities being dependent on a deliberate concentration of our attention does not always unambiguously decide as to which of two given intensities actually is the greater one, so that we have to invoke the economic principle as a criterion. It is only because of the economic principle being a synthetic law that we can use it as a criterion.

marginal utility theory finally has come to an end, being surrendered by its own supporters? Does it mean that the cornerstone, the marginal utility concept, being broken out of the structure of theory there is no choice but to interpret the foundations of economics in the dire light of Behaviourism as Pareto has indicated already with his "experimental" interpretation of the indifference curves¹ and as Allen and Hicks recently proposed for the theory of complementarity by using the "marginal rate of substitution" as a criterion?

It will be shown in what follows that this fortunately is not the case, that quite on the contrary it presents no serious difficulty to bring the marginal utility concept into line with Pareto's postulate. In part III a new modified way of introducing immeasurable psychological magnitudes into the equations of equilibrium will be proposed which, without giving up any proposition that can be claimed as legitimate possession of economics, does not use the second postulate and is therefore free from the objectionable features of the old method. Before we turn to this proposal, however, a careful investigation is required to discover precisely the point where the traditional method fails.

II

Since the problem of psychological measurement and its bearing on economic theory so far has proved to be one of the most puzzling riddles we will do well in examining this question to work with utmost logical precision. It has been shown above how Pareto's introduction of the postulate of index invariance has led to the conclusion that the concept of marginal utility is inadmissible in economic theory. For the sake of examining the stringency of this conclusion we will state it in an explicit form:

Major premise: Since marginal utility is immeasurable and since it is legitimate to represent it by means

¹ The marginal utility theory tries to *explain* the acts of choice relevant for economics by means of subsuming the marginal utilities of an individual which as motives or impulses are the determining causes of his decision under a law of nature, the economic principle. If therefore the marginal utility concept be banished from economics it would not be possible any longer to explain acts of choice. One would have to restrict oneself to mere registration and classification of the results of choice, i.e., to the observation of the individual's behaviour on the market.

of mathematical symbols it must occur in economic laws only in an index invariant form.

Minor premise: Marginal utility cannot, however, be represented in an index invariant form.

Conclusion: Marginal utility is an illegitimate concept in economic theory.

One will observe that the Major premise is composed of two propositions, namely:

Thesis I: Marginal utility is immeasurable—and

Thesis II: Mathematical representation of marginal utility is legitimate.

The conclusion—we will denote it as (I, II)—which is derived from them is at variance with the gist of the marginal utility theory which briefly might be expressed as

Thesis III: The marginal utility concept is legitimate.

The puzzle consists in the apparent incompatibility of theses I, II and III. This incompatibility is a mutual one, for one can also combine theses II and III to the following conclusion:

Minor premise: Since marginal utility cannot be represented in an index invariant form,

Major premise: though it is a legitimate concept which can be represented mathematically,

Conclusion (II, III): it follows that it is senseless to postulate index invariance.

The result thus derived is the anti-thesis to thesis I for, as was shown above, not admitting Pareto's postulate amounts to assuming that marginal utility must be measurable somehow.

And finally in order to exhaust all possibilities one can also combine I and III in order to obtain the anti-thesis II:

Minor premise: Since the mathematical representation—which is claimed to be legitimate—shows that marginal utility cannot be brought into an index invariant form,

Major premise: and since, on the other hand, marginal utility, though immeasurable, is undoubtedly a legitimate concept,

Conclusion (I, III): it follows that the mathematical representation of marginal utility is illegitimate.

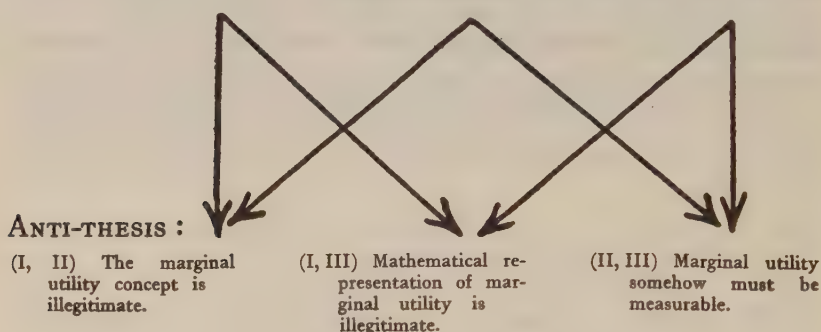
We thus have here a genuine antinomy: Three theses I, II and III appear to be incompatible with each other because any two of them combined yield the anti-thesis of the third. The following illustration will help to elucidate this queer position—the conclusions are indicated by arrows:

THESIS :

I. Marginal utility is immeasurable.

II. Mathematical representation of marginal utility is legitimate.

III. The marginal utility concept is legitimate.



It should be noted that each of the three conclusions which we have distilled here in logical purity actually play a rôle in this controversy. As regards (I, II) this is obvious as we have given already the example of the Paretian school; for (II, III) I can quote myself as an example when—in what I consider now a mistaken effort¹—I joined forces with Dr. Lange and pleaded for the “determinateness of the utility function,” i.e., for the exclusion of Pareto’s postulate. This type of conclusion implicitly characterises all those mathematical writers who shrink from discarding the marginal utility concept. Of course, it cannot be denied that one rarely finds mention of measurability of utility

¹ Viz., my contribution in the discussion of Oskar Lange’s note, l.c.

as its radical consequence in their books, but they all are written in a way *as if* utility were measurable. Take, e.g., A. L. Bowley's *Mathematical Groundwork of Economics* as an excellent representative of a large species: there the whole structure of theory appears to be based on the two postulates mentioned above, the second of which excludes the possibility of choosing utility index functions at random.¹ It is true that Professor Bowley carefully distinguishes between those parts of economics which depend on the first postulate only and those which require the second. But are we entitled to the conclusion that he considers the latter portion as a hypothetical plaything only constructed right in the blue?²—The third type of conclusion (I, III) I find most characteristically embodied in an excellent article by Professor Bilimović which expresses the opinion of numerous writers belonging to the Austrian school.³ We will have to say more about some of Professor Bilimović's arguments in a moment.

Before we proceed to solve this antinomy we should like to impress it upon the reader that any real solution can only consist in showing the mutual compatibility of theses I, II and III. Because each of these theses appears to be equally well founded on reason as well as experience. As for thesis I the fact cannot be doubted that psychological magnitudes, by their very essence, are immeasurable and that Pareto's postulate therefore cannot be set aside. With regard to III nobody who ever has understood the marginal

¹ Actually Bowley uses three postulates, but for the sake of simplicity I have combined his first two into one sentence. My postulate II is thus identical with his third one.

² A. C. Pigou in his book *The Economics of Stationary States* (App. II to Ch. VIII) remarks, after stating the Edgeworth-Pareto definition of complementarity which is "currently accepted among economists": "It has been suggested by Dr. Hicks, basing himself on Pareto, that" this definition is "ambiguous. All that is meant, however, is that the values of $\frac{\partial^2 \phi}{\partial x \partial y}$ and $\frac{\partial^2 \phi}{\partial y \partial x}$ cannot be unambiguously inferred from a knowledge of people's scale of

preference and indifference as between related commodities; for the reason that" $\frac{\partial \phi}{\partial x}$ and $\frac{\partial \phi}{\partial y}$ themselves "cannot so be inferred. If we postulate" $\frac{\partial \phi}{\partial x}$ and $\frac{\partial \phi}{\partial y}$ "to start with, there is no difficulty."

This method of cutting the knot will, of course, provoke the counter-question from the Paretian camp: But how can you postulate those marginal utilities? And if you start with them "to begin with" the same difficulty will occur with total utility.

However, the reader will discover in what follows that Pigou's idea of solving the riddle comes very near to the method proposed in part III of this essay.

³ Alexander Bilimović: "Wie können unmessbare psychische Größen in das Gleichungssystem des wirtschaftlichen Gleichgewichts eingeführt werden?" *Ztschr. f. Nat. Oekon.* Vienna, 1934.

utility theory in all its lucidity and power of analysis will entertain doubts that its essential tool, the notion of marginal utility, is a perfectly legitimate concept. And as far as II is concerned the astonishing success of mathematical economics makes any such suspicion as that of Professor Bilimovič and his followers altogether too improbable.

The three possible conclusions from theses I, II and III have been given in the foregoing in their explicit form in order to enable the reader to see immediately that their stringency depends essentially on one premise of which we have not spoken so far, namely the statement that marginal utility cannot be introduced in an index invariant form. Since we are proposing to accept theses I, II and III undisputed, our attention naturally will be focussed on this statement. Its logical rôle in the process of each of the three conclusions is obvious: this proposition is the minor premise that furnishes in each case the *terminus medius*. This very important observation gives a hint as to how the dilemma can be solved: since it is logically impossible to derive any conclusion without a *terminus medius* the compatibility of theses I, II and III would be established if we succeed in eliminating this premise.

Now it is obvious that it does not follow analytically from the concept of marginal utility that it cannot be introduced in an index invariant form. On the contrary this statement is the result of the *tacit* assumption that marginal utility stands to total utility in the relation of differential to integral. It is only because an integral function $\phi(x, y, z, \dots)$ is being used to represent total utility whereas it is customary to represent marginal utilities

by its differentials $\frac{\partial \phi}{\partial x}, \frac{\partial \phi}{\partial y}, \frac{\partial \phi}{\partial z}, \dots$ etc., that the mathe-

matical impossibility of transforming differentials without disturbing the order of their magnitude is made to apply to marginal utilities.

By treating marginal utilities as differentials of total utility one imposes upon them properties which they clearly do not have. This can be easily seen in the following way: the mathematical reason that differentials cannot be transformed in the same mode as their integral function lies in that the integral is defined as the limit of the *sum* of its

differentials.¹ If one therefore imposes the same rule on marginal utilities one implies that also total utility is the sum of marginal utilities. Utilities, total and marginal alike, are, however, *intensive* magnitudes and it is the defining characteristic of such magnitudes that they cannot be conceived as composed out of parts. Summation of intensities in any algebraical sense is *ex definitione* impossible. No wonder, therefore, if in using this assumption one comes later on to paradoxical results.

The assumption that total utility is the integral of marginal utilities, therefore, is illegitimate and has to be discarded. It should be noted that Bilimović made this assumption the central target of his critical attack.² But does this imply that mathematical representation of total and marginal utility is not any longer possible? Obviously this would be the case only if mathematical representation of marginal utilities *necessarily* would mean representation by differentials. However, only a little acquaintance with the wealth of mathematical forms and the possibilities of their application is required in order to see that this cannot be the case.³

Representation of marginal utilities by means of differentials, however, is the customary method in economic theory and it easily appears to be justified by time-honoured tradition. Thus it is easy to understand that—in the absence of attempts to devise a more suitable treatment—one tacitly took it for granted that this is the *only* method. Formulating this attitude in form of a premise we obtain the false

Thesis IIa: Mathematical representation of marginal utility is legitimate *and* it implies that total utility = integral of marginal utilities.

It is this argument that, underlying the conclusions of all three parties, causes the deadlock of the antinomy. In order to avoid the dilemma it is necessary and sufficient to replace IIa by the correct

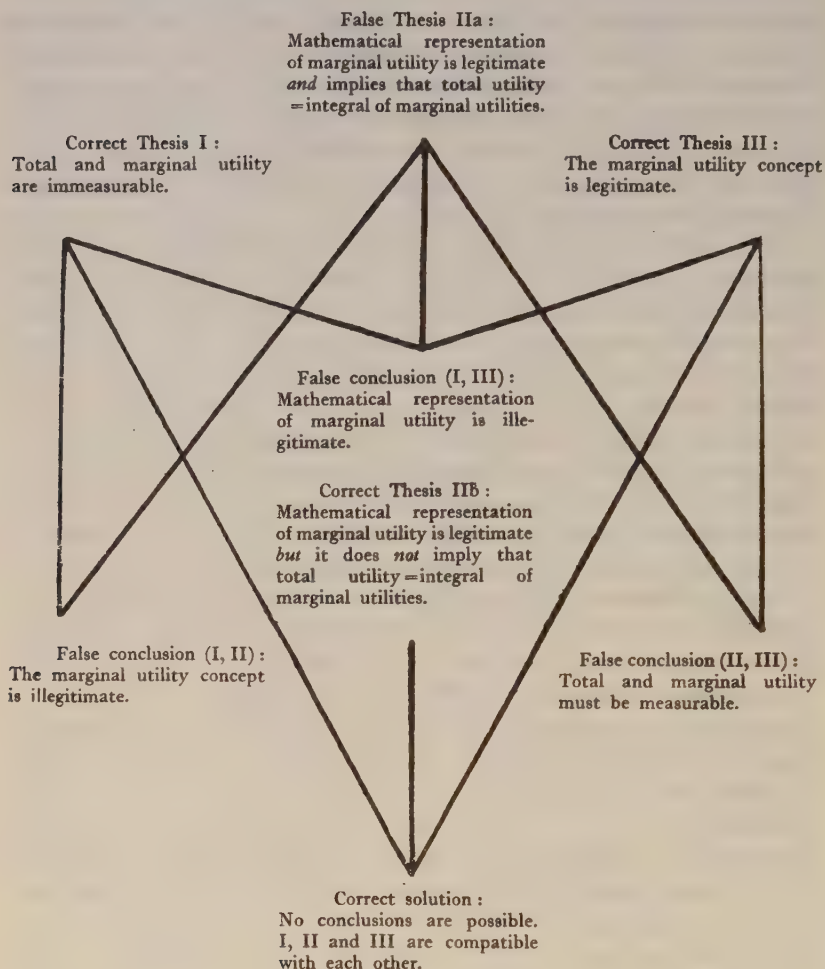
Thesis IIb: Mathematical representation of marginal utility is legitimate *but* it does *not* imply that total utility = integral of marginal utilities.

¹ $a + b = c$, where $a < b$, will yield in general $F(a) + F(b) = F(c)$ and $F(a) < F(c)$ only if F has the form $F(x) = Ax$ where A is an arbitrary positive constant. One verifies immediately that $Aa < Ab$ and $Aa + Ab = A(a + b) = Ac$. The analogous rule holds for limits of sums, i.e., integrals.

² Bilimović, l.c., p. 147 and *passim*.

³ In part III the reader will find a positive proof for this contention.

The solution then takes the following form :



To sum up: the Paretian school is mistaken if, in concluding according to the pattern (I, II), it tries to eliminate the marginal utility concept thus forcing economics into the arms of Behaviourism. Instead of putting the blame on marginal utility they should realise that in reality the trouble arises only from the trivial fact that it is inconsistent to postulate index invariance and at the same time to retain a method of representing total and marginal utilities which cannot fulfil this condition. On

the other hand those are mistaken who, according to pattern (II, III), either try their wits on the hopeless task of measuring utility in spite of its immeasurability or resign in proposing those portions of economics which at present are not yet formulated in accordance with Pareto's postulate in a hypothetical form only, i.e., as if utility were measurable. The mistake in pattern (I, III) lies in not realising that the statement that "A and B is false" logically leaves two possibilities, namely either that one has "A false and B right" or "A right and B false." In this conclusion only the first possibility is taken into account. The second possibility, however, opens the way out of the dilemma and it is this way which economic theory has to go. It makes it necessary to revise the traditional method of introducing the immeasurable psychological magnitudes into the equations of equilibrium.¹ How this could be done without serious difficulty we will now proceed to demonstrate.²

III

If in mathematical economics the marginal utility of a certain finite but small increment dx which a person wants to acquire in addition to the stock x which is already in his possession is denoted as $\frac{\partial \phi}{\partial x} dx$, this is not done because of special stress being laid upon the product relation between $\frac{\partial \phi}{dx}$ and dx —since what could be the meaning of the product of an intensive magnitude like $\frac{\partial \phi}{dx}$ and an extensive one like dx ?³ The notation is only chosen in order to express that the intensity of marginal utility depends on two variables: on the amount of x as well as on the magnitude

¹ In his essay—"Irving Fisher's statistische Methode für die Bemessung des Grenznutzens"—*Ztschr. f. Nat. Oekon.*, Vienna, 1929—Bilimovič sums up his arguments as follows: "Utility is, and will remain, only a *comparable* but not *measurable* magnitude . . . Attempts to treat utility like an ordinary extensive magnitude, in our opinion, . . . are bound to fail . . . One cannot subject utility to the ordinary arithmetic and algebraic operations. Only special kinds of mathematical analysis will be applicable. And perhaps they will be applied in future." I hope to convince Professor Bilimovič that he need not wait any longer.

² I am indebted to Dr. Grete Hermann for suggesting this method as a possible way out of the dilemma. Cp. *Abb. d. Fries'schen Schule*, N.F. Vol. VI, pp. 216 ff.

³ Mathematical economists tend to slide over the troublesome question as to the significance of this relation with characteristic silence. A noteworthy exception is Jevons who tried to use it in his curious *Theory of dimensions of economic quantities*. Cp. Jevons, l.c., p. 61,

of dx . Obviously it would be possible to express this relation in the more general form $f(x; dx)$, where the variable behind the semicolon denotes the amount of the commodity which the person wants to acquire, whereas the variable before the semicolon means the amount which is already in his possession. It is superfluous to assume that this functional relationship is of the form of a product.

In the following we will therefore use this notation and prove that this alteration—trivial as it may seem—is quite sufficient to overcome the troubles of immeasurability. We note firstly that this way of writing marginal utilities can be extended to any number of variables, and secondly that for the sake of generality we can drop the assumption that the increments need to be “finite but very small”.¹ Let $x, y, z, \dots$ be a stock of goods which are already in possession of an individual and let $\xi, \eta, \zeta, \dots$ be a combination of increments of any size on which he has cast his eyes; then $f(x, y, z, \dots; \xi, \eta, \zeta, \dots)$ shall denote the utility of these increments. If the $\xi, \eta, \zeta, \dots$ happen to be relatively small we can continue to speak in the usual way of marginal utility, if not it would be better perhaps to introduce the term “conditional utility” or “utility of $\xi, \eta, \zeta, \dots$ under the condition that $x, y, z, \dots$ are already in his possession.”

How could one in this notation express the total utility of a stock $\xi, \eta, \zeta, \dots$? In order to see this one only has to make it clear what is meant by total utility and a hint of Professor Mises will prove useful in this connection: “When a stock is valued as a whole, its marginal utility, that is to say, the utility of the last available unit of it, coincides with total utility, since the total supply is one indivisible quantity.”² Total utility, in other words, is nothing but the (marginal) utility of $\xi, \eta, \zeta, \dots$ under the condition that *no* amounts of $x, y, z, \dots$ have been previously in possession of the individual. Hence we simply will denote total utility as $f(0, 0, 0, \dots; \xi, \eta, \zeta, \dots)$.

For those situations with which economic theory has to deal it is generally reasonable and legitimate to assume

¹ We do this in order to please those numerous authors who object to mathematical economics on account of its operating with “differentials.” The assumption of perfect divisibility of goods has been retained, however, in view of the necessity of writing this essay on a limited number of pages. But any reader who does not dread the tiresome procedure will verify himself that this method would work even under the most rigid assumption with regard to indivisibility of the quantities involved.

² L. von Mises: *Theory of Money and Credit*, Engl. trans., p. 47.

that the utility function $\phi(x, y, z, \dots)$ fulfils the following three conditions:

$$\text{I. } \frac{\partial \phi}{\partial x} > 0, \frac{\partial \phi}{\partial y} > 0, \dots \quad \text{II. } \frac{\partial^2 \phi}{\partial x^2} < 0, \frac{\partial^2 \phi}{\partial y^2} < 0, \dots$$

$$\text{and III. } \frac{\partial^2 \phi}{\partial x \partial y} \leq 0 \text{ (one of the three cases).}$$

Conditions I and II are known as the Gossen laws and condition III is the criterion of complementarity. Translated from mathematical shorthand into every-day language these conditions read:

I. Total utility will increase if the total stock in possession of the individual increases.

II. Marginal utility of x , or of y , will decrease if the total stock of x , or of y , increases.

III. Marginal utility of x will either remain the same, or it will be positively, or negatively, affected if the total amount of the other commodity, i.e., y , varies.

In the new notation these assumptions obviously have to be substituted by the following:

$$\text{Ia. } \frac{\partial f(0, 0, 0, \dots; \xi, \eta, \xi, \dots)}{\partial \xi} > 0,$$

$$\frac{\partial f(0, 0, 0, \dots; \xi, \eta, \xi, \dots)}{\partial \eta} > 0, \dots$$

or even more general

$$\frac{\partial f(x, y, z, \dots; \xi, \eta, \xi, \dots)}{\partial \xi} > 0,$$

$$\frac{\partial f(x, y, z, \dots; \xi, \eta, \xi, \dots)}{\partial \eta} > 0, \dots$$

for all values of $x, y, z, \dots$

$$\text{IIa. } \frac{\partial f(x, y, z, \dots; \xi, 0, 0, \dots)}{\partial x} < 0,$$

$$\frac{\partial f(x, y, z, \dots; 0, \eta, 0, \dots)}{\partial y} < 0, \dots$$

$$\text{IIIa. } \frac{\partial f(x, y, z, \dots; \xi, 0, 0, \dots)}{\partial y} \leq 0.$$

Ia. determines the reactions of total utility, IIa and IIIa of marginal utility under the influence of changing amounts of goods.

One will notice one essential difference: whereas in the old notation II and III only could be expressed by means of the second derivative of ϕ , in the new notation every property of the utility function is expressed by means of first derivatives. In this difference lies the great advantage of the new notation over the old one. It will be remembered that the Pareto postulate seemed to render condition II and III meaningless merely on account of their being expressed in terms of second differentials. The new notation, however, is invariant with regard to any choice of another utility index $F(f)$ —so long as only $F' > 0$. The reason for this lies in the simple fact that in the new notation marginal and total utility are not any longer treated, so to speak, as standing on different footings, the one being a differential the other an integral.

By means of this simple alteration we have thus succeeded in re-establishing the old Edgeworth-Pareto definition of complementarity. This result should not come as a surprise; the old definition had a perfectly straightforward psychological meaning. Instead of rashly concluding that it was "senseless" when it did not seem to fit into the traditional apparatus of mathematical utility analysis one rather should have concluded that one's methods were at fault. It shall not be disputed that the new behaviouristic definition of complementarity by means of what is termed the "marginal rate of substitution" may have a legitimate meaning, too, and may prove useful in co-ordinating, e.g., the theories of value and of production. All that is refuted here is the claim that the new method is the *only* legitimate one. Obviously there are two methods of defining complementarity¹: the psychological one which has been used by mathematical economics so far and which has the advantage of great simplicity and lucidity and the behaviouristic way which may lead to valuable results in the future. Naturally the two definitions will not lead to the same results but this need not give reason for anxiety. Definitions cannot be true or false; it is a mere matter of convenience as to what method is adopted and if both methods be used simultaneously mere equivocations will not mean real contradictions.

But the consequences of the new method of introducing

¹ A lucid account as to how the two definitions are related to each other will be found in the essay by Henry Schultz: "Interrelations of Demand, Price and Income," *Journal of Political Economy*, August, 1935.

indices of utility go further than that. The elimination of the difference in character between total and marginal utility leads to a noteworthy simplification of the foundations of economic theory. It has been mentioned above that mathematical economics is based on two postulates of which the second one is laid open to serious objection. Now the second postulate is required in order to provide the marginal utilities with characteristic indices of the utility function just as the first postulate does the same for total utilities. Only because of their being treated as different in the old notation has one to rely on two different postulates, the one for total, the other for marginal utilities. Since in the new notation their difference disappears the second postulate is rendered superfluous.

It thus can be claimed for this new way of introducing psychological qualities into the equations of equilibrium that—because of its making use only of postulate I¹—it puts the whole of mathematical economics on a reliable basis, those portions included which so far were considered as dubious on account of their depending on postulate II.² It has been shown by this that those painful amputations which certain followers of Pareto, for the sake of scientific rigour, advocate for economics really are quite superfluous. A slight alteration of Pareto's ingenious index theory of utilities is sufficient to render null and void all those arguments in favour of eliminating the marginal utility concept from economics and of restricting this science to a branch of Behaviourism, arguments that appeared to be the inevitable consequence of his idea.

¹ It should be noted in this connection that speaking of "Postulate I" is somewhat of a misnomer, and I have adopted this name only because of its being in current use. There is, however, nothing in the proposition in question that really is *postulated* without being capable of proof. It can be demonstrated from the mathematical axioms to which the intensities of utility are subjected that they form a mathematical continuum in the strict sense of the term. (See my *Grundlagen der ökonomischen Theorie*, Tübingen, 1933, p. 38, footnote 3.) The so-called Postulate I is only an explicit statement of this property which enables one *eo ipso* to correlate the degrees of intensity one by one with the elements of any other continuum, e.g., the continuum of real numbers, so that the relations of order in both continua are the same.

² A friend, himself deeply involved in speculation over the mysteries of this paradox, when confronted with this solution remarked: "But that is only a mathematical trick!" —If he means to say that I made the problem disappear by a conjurer's trick only I must insist, of course, that my logic be exposed as faulty. As far as the general impression goes, however, I am entirely in agreement and I feel inclined to quote J. F. Fries' trenchant remark: "All philosophical riddles have a similarity with Columbus' problem to put an egg on the table. As soon as the solution is known one hardly can see any more how the problem was possible—everything being so completely clear and simple. The essential point is namely to use a clear-cut and precise abstraction which is difficult to acquire for the first time; later on, however, easy enough to apply." (*Neue oder anthropologische Kritik der Vernunft*, Heidelberg, 1828, p. 6.)

IV

A word should be added about the practical consequences of this new method. Would it be necessary to rewrite the textbooks? I feel inclined to consider such an opinion as too puristic. Generally it is not advisable in a science to break away from a firmly established tradition. The new method might prove to be slightly more cumbersome than the elegant deductions which can be obtained by means of the differential notation. One could retain the traditional method as a *façon de parler*, if only economists become aware what they are doing and let themselves not any longer get entangled in the pitfalls of the measurability dispute.¹

There are precedents for such a course in other sciences. In modern infinitesimal calculus, e.g.,—*lucus a non-lucendo*—"infinitesimals" do not any longer occur, nevertheless most mathematicians do not feel inclined to abandon the symbolism introduced by Leibniz, because it has proved too valuable in its simplicity and elegance. Of course, there are also certain drawbacks to be considered. Just as in mathematics it is to be feared, might there be an unending tradition of more philologically minded critics for whom—since they will not take the trouble to make themselves properly acquainted with what really is meant—such a *façon de parler* will prove to be an insuperable hurdle. One may hope, however, that with growing progress of economic science, their opinions gradually will relapse into obscurity.

APPENDIX

An example may prove helpful in explaining the proposed method of introducing total and marginal utility into the equations of equilibrium. Let

$$(I) \quad \phi(x, y) = \frac{A}{2} x^2 + Bxy + \frac{C}{2} y^2 + Dx + Ey$$

be the usual equation of an indifference map. One has

¹ If this course should be adopted one would have to state explicitly that the differential-integral relation between marginal and total utility has no real significance of its own but that it is introduced only for the sake of convenience as an entirely arbitrary convention. One would have to demonstrate that it is this act of arbitrariness only that necessitates the use of postulate II, and that consequently once this convention was adopted there would be no further point in considering the second postulate as of dubious nature.

$$(2) \left\{ \begin{aligned} \Delta \phi &= \frac{\partial \phi}{\partial x} dx + \frac{\partial \phi}{\partial y} dy + \frac{1}{2} \left\{ \frac{\partial^2 \phi}{\partial x^2} dx^2 + 2 \frac{\partial^2 \phi}{\partial x \partial y} dx dy \right. \\ &\quad \left. + \frac{\partial^2 \phi}{\partial y^2} dy^2 \right\} + \dots \\ &= (Ax + By + D) dx + (Bx + Cy + E) dy + \frac{A}{2} dx^2 \\ &\quad + B dx dy + \frac{C}{2} dy^2. \end{aligned} \right.$$

Write $dx = \xi$ and $dy = \eta$. Put

$$(3) f(x, y; \xi, \eta) = (Ax + By + D) \xi + (Bx + Cy + E) \eta + \frac{A}{2} \xi^2 + B \xi \eta + \frac{C}{2} \eta^2.$$

Then $f(x, y; \xi, \eta)$ as well as any arbitrary function $F(f)$ —subjected only to the limitation $F' > 0$ —will provide a suitable index invariant representation of the relevant properties of the indifference field.

Observe that the expression for the total utility of ξ, η

$$f(0, 0; \xi, \eta) = \frac{A}{2} \xi^2 + B \xi \eta + \frac{C}{2} \eta^2 + D \xi + E \eta$$

is equivalent to (1). The equivalence of the conditions I, II and III on the one side and of Ia, IIa and IIIa on the other side is shown in the following juxtaposition: (Keep in mind that $F' > 0$)

$$\text{I. } \frac{\partial \phi}{\partial x} = Ax + By + D > 0 \quad \text{Ia. } \frac{\partial f(0, 0; \xi, \eta)}{\partial \xi} = A\xi + B\eta + D > 0,$$

and similarly for $\frac{\partial \phi}{\partial y}$ and $\frac{\partial f(0, 0; \xi, \eta)}{\partial \eta}$.

$$\text{II. } \frac{\partial^2 \phi}{\partial x^2} = A < 0 \quad \text{IIa. } \frac{\partial^2 f(x, y; \xi, 0)}{\partial x^2} = A\xi < 0$$

or, since $\xi > 0$, $A < 0$.

The same holds for $\frac{\partial^2 \phi}{\partial y^2}$ and $\frac{\partial^2 f(x, y; 0, \eta)}{\partial y^2}$.

$$\text{III. } \left. \begin{aligned} \frac{\partial^2 \phi}{\partial x \partial y} \\ \frac{\partial^2 \phi}{\partial y \partial x} \end{aligned} \right\} = B \begin{matrix} \geq \\ \leq \end{matrix} 0 \quad \text{IIIa. } \begin{aligned} \frac{\partial f(x, y; \xi, 0)}{\partial y} &= B\xi \begin{matrix} \geq \\ \leq \end{matrix} 0 \\ \frac{\partial f(x, y; 0, \eta)}{\partial x} &= B\eta \begin{matrix} \geq \\ \leq \end{matrix} 0. \end{aligned}$$

Since $\xi > 0$ and $\eta > 0$ one has $B \begin{matrix} \geq \\ \leq \end{matrix} 0$.

The equation of an indifference curve through a given point ξ_1, η_1 becomes :

$$f(0, 0; \xi, \eta) = f(0, 0; \xi_1, \eta_1) \text{ or}$$

$$\frac{A}{2} \xi^2 + B\xi\eta + \frac{C}{2} \eta^2 + D\xi + E\eta = \text{const.}$$

which is equivalent to $\phi(x, y) = \text{const.}$

The equation of the offer curve

$$(4) \quad \frac{\partial \phi}{\partial x} x + \frac{\partial \phi}{\partial y} y = 0 = (Ax + By + D)x + (Bx + Cy + E)y$$

is obtained by means of combining

$$(5) \quad \left\{ \begin{array}{l} (a) \quad d\phi = \frac{\partial \phi}{\partial x} dx + \frac{\partial \phi}{\partial y} dy = 0 \\ \text{and} \\ (b) \quad y = px, \quad p = \text{const.}, \text{ i.e., } \frac{y}{x} = \frac{dy}{dx}. \end{array} \right.$$

Put $\frac{\eta}{\xi} = \frac{y}{x}$, i.e., $\xi = \lambda x$ and $\eta = \lambda y$ where λ is an indeterminate factor of proportionality. Substitute these values in (3) :

$$f(x, y; \lambda x, \lambda y) = \lambda \left[(Ax + By + D)x + (Bx + Cy + E)y \right] \\ + \lambda^2 \left[\frac{A}{2} x^2 + Bxy + \frac{C}{2} y^2 \right]$$

For small values of λ which we may assume in analogy to (5b) one can neglect

$$\lambda^2 \left[\frac{A}{2} x^2 + Bxy + \frac{C}{2} y^2 \right]$$

Put in accordance to (5a)

$$f(x, y; \lambda x, \lambda y) = 0 = \lambda \left[(Ax + By + D)x + (Bx + Cy + E)y \right]$$

for small values of $\lambda \neq 0$. This relation can be fulfilled only if

$$(Ax + By + D)x + (Bx + Cy + E)y = 0$$

which is equivalent to (4).

The reader will satisfy himself that this demonstration does not depend on the particular choice of ϕ but that it easily can be generalised.

The Diagrammatical Representation of Elasticity of Supply

By R. F. FOWLER

I

It is often found useful, for purposes of exposition, to represent the elasticity of demand in diagrammatical form. One of the simplest and most useful representations is that relating to elasticity of a unit demand curve, given by Marshall in Note III of the Mathematical Appendix. An equally simple and useful method when integral curves are used was suggested by Mr. Lerner in the first number of the *Review of Economic Studies*. There does not, however, appear to be any systematic analysis in geometrical terms of *elasticity of supply*. Elasticity of demand is usually measured, following Marshall, by the ratio of the two parts of the tangent to a demand curve which are cut off by the two axes and an ordinate passing through the demand curve at the given price. This method is clearly inapplicable to the representation of elasticity of supply; for with a rising supply curve the upper part of the tangent is infinitely great. Although Marshall did not attempt to give a geometrical measurement of elasticity of supply, the method of doing so which is suggested below is derived directly from his other measurement of elasticity of demand. If T is the point on the X axis where the tangent to the demand curve at a given price cuts the X axis and M is the point where the ordinate through the demand curve at the given price cuts the X axis, elasticity of demand is measured by the ratio $\frac{TM}{OM}$. Elasticity of supply can also be measured on the X axis.

II

In Figure 1 let P, P_1 be consecutive points on the supply curve. Extend PP_1 to cut the X axis at T and drop perpendiculars from P and P_1 to cut the X axis at M and M_1 .

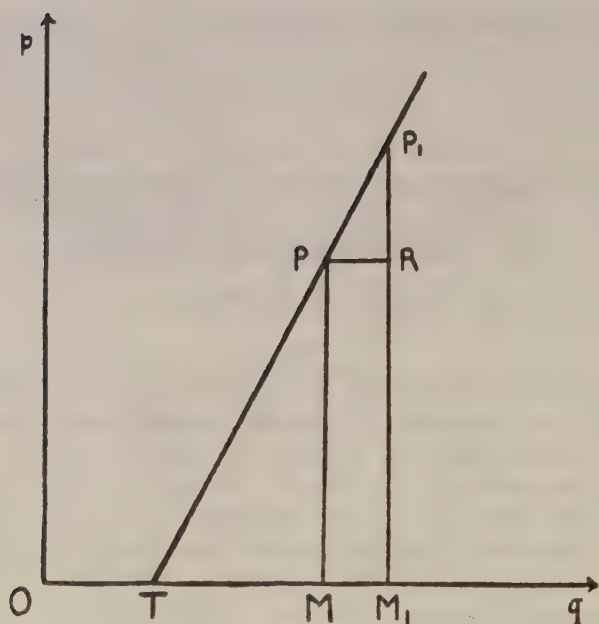
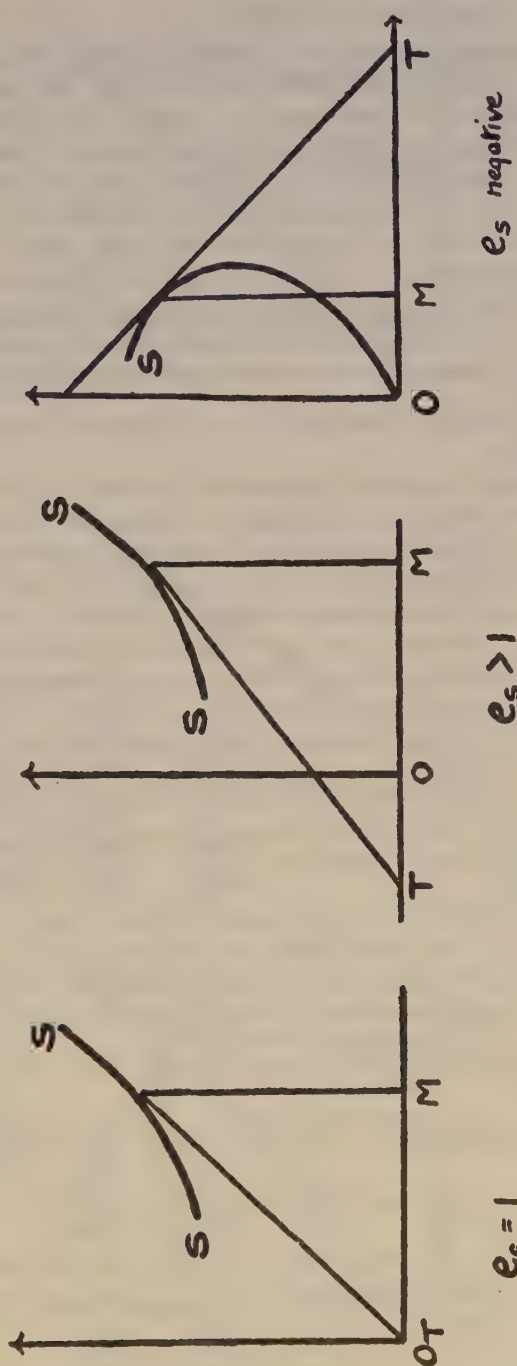


Fig. 1

Then PR is the increase in output supplied when price rises by P_1R . The elasticity of supply at P is measured by

$$\frac{PR}{OM} \div \frac{P_1R}{PM} = \frac{PR}{OM} \times \frac{PM}{P_1R} = \frac{PR}{P_1R} \times \frac{PM}{OM} = \frac{TM}{PM} \times \frac{PM}{OM} \\ = \frac{TM}{OM}.$$

When the distance between P and P_1 is made very small PT becomes the tangent to the supply curve at P . If the tangent to the supply curve at a particular price passes through the origin the elasticity of supply is equal to unity. If the tangent cuts the X axis negatively then the elasticity is greater than unity; for TM is geometrically greater than OM . When the supply curve curls back towards the Y axis the tangent is negatively inclined and cuts the X axis to the right of M ; the elasticity can therefore be greater or less than unity but will be negative algebraically. These three cases are illustrated in Figure 2. It can be seen that if the supply curve is a horizontal line parallel to the X axis TM becomes infinitely great and the supply is then infinitely elastic; while if the supply curve is a vertical line, TM is zero and the elasticity of supply is zero.



$e_s > 1$
Fig. 2

STRAIGHT LINE SUPPLY CURVES.

Let the supply curve be a straight line passing through the origin. Then T coincides with O and the elasticity is equal at all prices and equal to unity. If, however, the supply curve is a straight line which does not pass through the origin the elasticity of supply will not be the same at different prices. If the supply curve cuts the X axis positively the elasticity of supply will be less than unity and will gradually increase as price increases. When the supply curve cuts the X axis negatively elasticity of supply will be greater than unity and will gradually decrease as price increases. These results are shown geometrically in Figure 3.

POINTS OF EQUAL ELASTICITY ON STRAIGHT-LINE SUPPLY CURVES.

If a series of straight-line demand curves cut the Y axis at the same point the elasticity of demand at any given price will be the same for each demand curve. On the other hand, if the demand curves are parallel to each other the points on the different demand curves at which the elasticities of demand are equal are those which lie on a straight line passing through the origin. Exactly the same rules apply in the case of elasticity of supply. In Figure 4 three supply curves cut the Y axis negatively at L . It is

easily seen that at a given price OP , $\frac{T_1P_1}{T_1L} = \frac{T_2P_2}{T_2L}$
 $= \frac{T_3P_3}{T_3L}$ and therefore $\frac{T_1M}{OM_1} = \frac{T_2M_2}{OM_2} = \frac{T_3M_3}{OM_3}$. The
 elasticities of supply at the price OP are equal.

In Figure 5 the elasticities are greater than unity and the supply curves cut the Y axis positively at the same point L . The elasticities of supply at the price OP are $\frac{T_1M_1}{OM_1}$, $\frac{T_2M_2}{OM_2}$ and $\frac{T_3M_3}{OM_3}$. Since P_1 , P_2 and P_3 lie on a

straight line parallel to the X axis, $\frac{T_1L}{LP_1} = \frac{T_2L}{LP_2} = \frac{T_3L}{LP_3}$,
 $\frac{T_1O}{OM_1} = \frac{T_2O}{OM_2} = \frac{T_3O}{OM_3}$ and $\frac{T_1M_1}{OM_1} = \frac{T_2M_2}{OM_2} = \frac{T_3M_3}{OM_3}$.

In Figure 6 the straight-line supply curves are parallel cutting the Y axis negatively at L_1 , L_2 and L_3 . Therefore $\frac{T_1P_1}{L_1P_1} = \frac{T_2P_2}{L_2P_2} = \frac{T_3P_3}{L_3P_3} = \frac{T_1M_1}{OM_1} = \frac{T_2M_2}{OM_2} = \frac{T_3M_3}{OM_3}$.

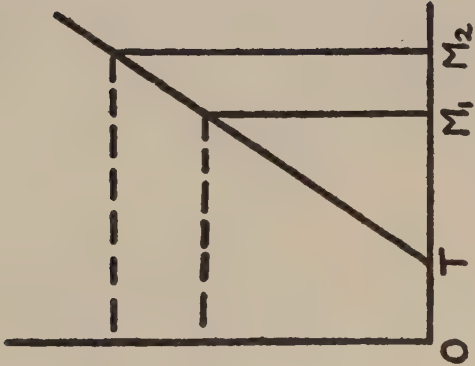
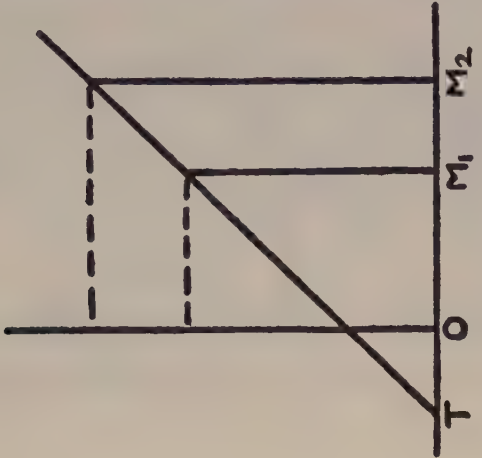
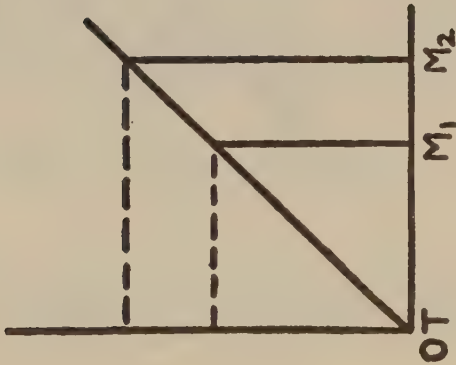


Fig. 3



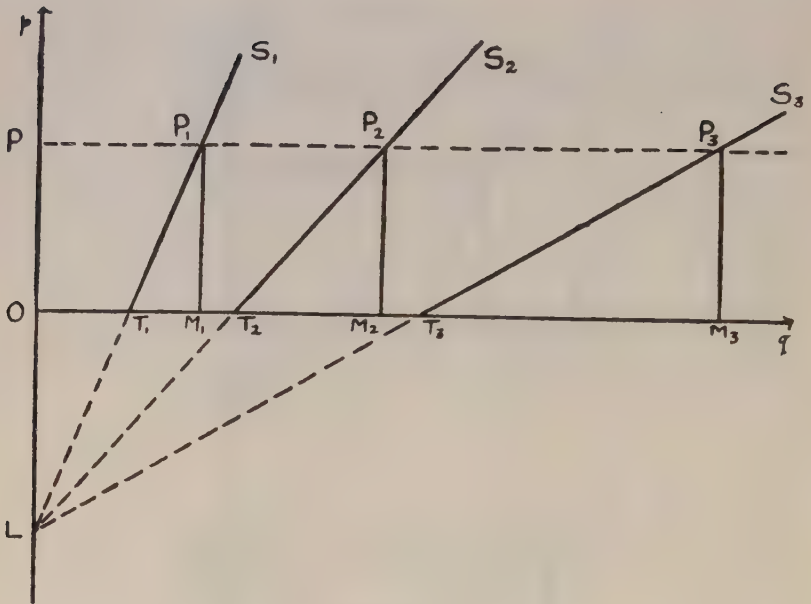


Fig. 4

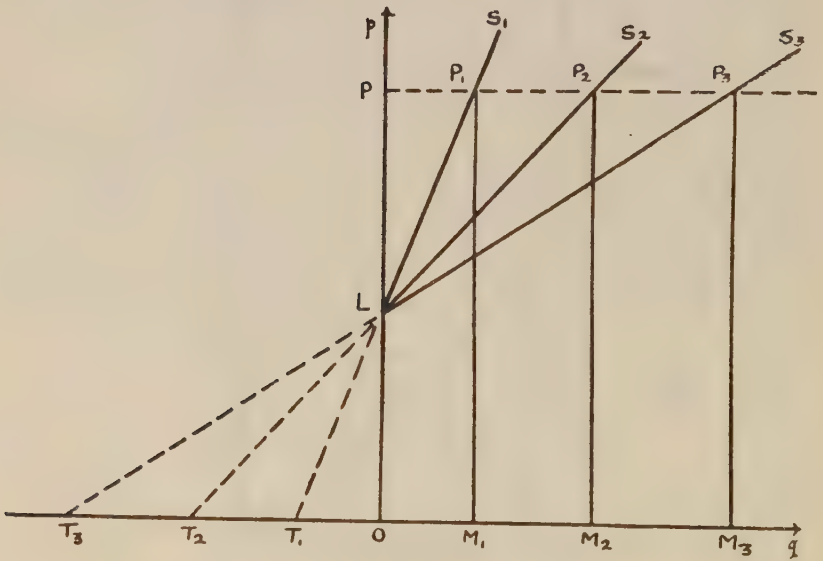


Fig. 5

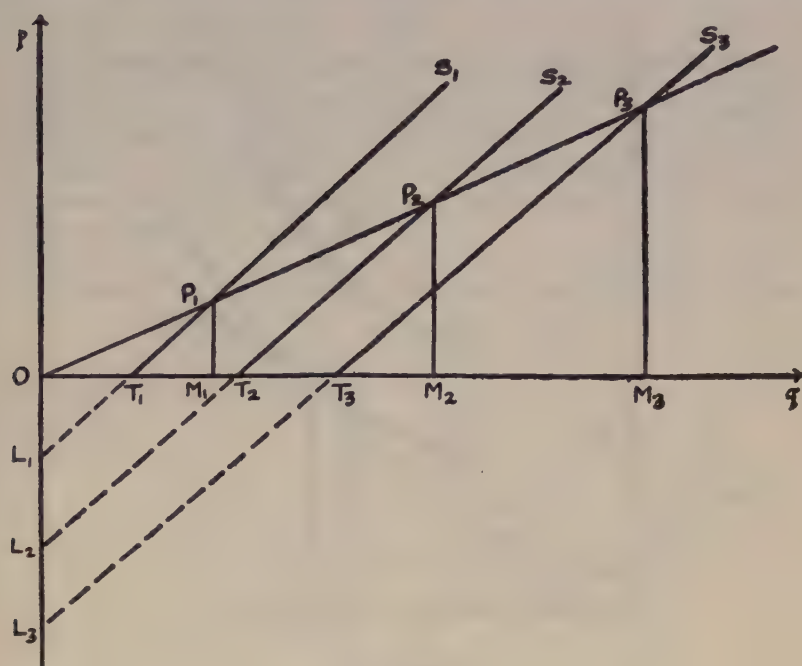


Fig. 6

THE EFFECTS ON ELASTICITY OF SUPPLY OF IMPOSING A TAX.

The effects on elasticity of supply of imposing an *ad valorem* or a specific tax can be seen easily from the above diagrams. In Figure 7 the supply curve S_1S_1 is shifted to the position S_2S_2 as the result of the imposition of an *ad valorem* tax. The tangents at P_1 and P_2 will both cut the X axes at T and the elasticity of supply being equal

to $\frac{TM}{OM}$ will remain unchanged for the output OM . A specific

tax will raise the supply curve by an equal amount so that the tangents at P_1 and P_2 will be parallel. The elasticity at P_2 is now greater than at P_1 (Figure 8). It can thus be seen that a specific tax will make the supply more elastic than an *ad valorem* tax.

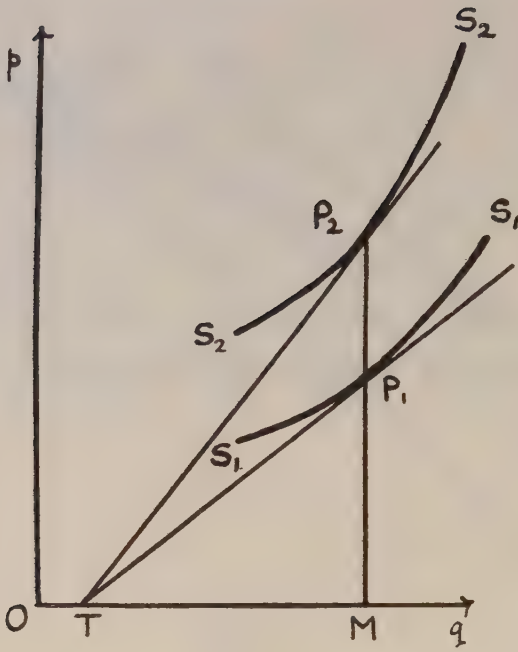


Fig. 7

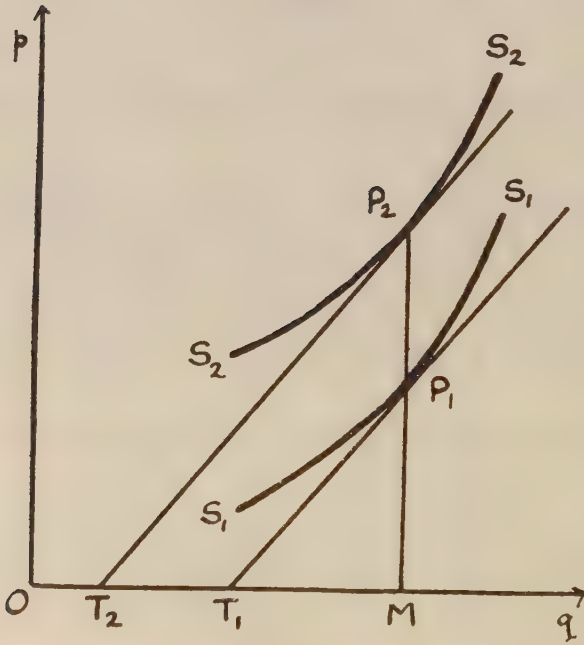


Fig. 8

III

Mrs. Robinson has shown that the elasticity of demand is equal to $\frac{\text{average value}}{\text{average value} - \text{marginal value}}$. It is possible to show geometrically that a similar relationship holds between elasticity of supply and the corresponding average and marginal values.

(I) ELASTICITY OF SUPPLY POSITIVE AND GREATER THAN UNITY.

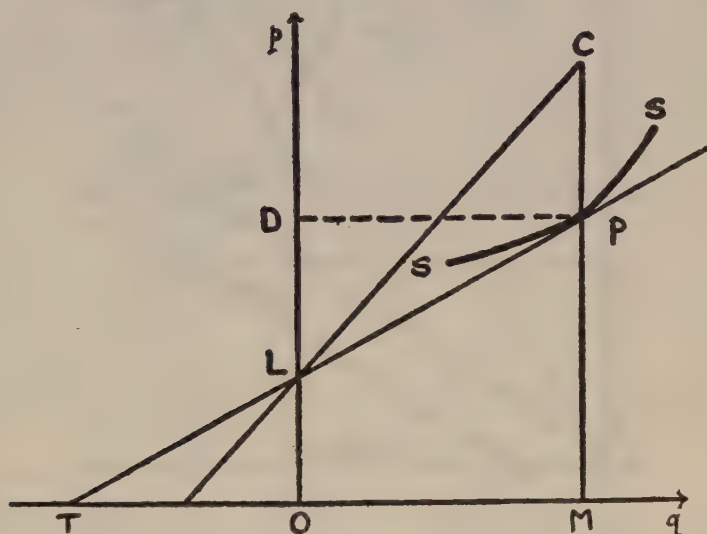


Fig. 9

In Figure 9 draw LC the marginal curve to the tangent TP .

Then elasticity of supply at price $P = \frac{TM}{OM}$

$$= \frac{TP}{LP} = \frac{OD}{LD}$$

But $LD = CP$, for the area $ODPM = \text{area } OLCM$.

$$\text{Therefore } e_s = \frac{MP}{CP}$$

$$= \frac{\text{Average Supply Price}}{\text{Marginal Supply Price} - \text{Average Supply Price}}$$

$$\text{and Marginal Supply Price} = \text{Average Supply Price} \frac{(1 + e_s)}{e_s}$$

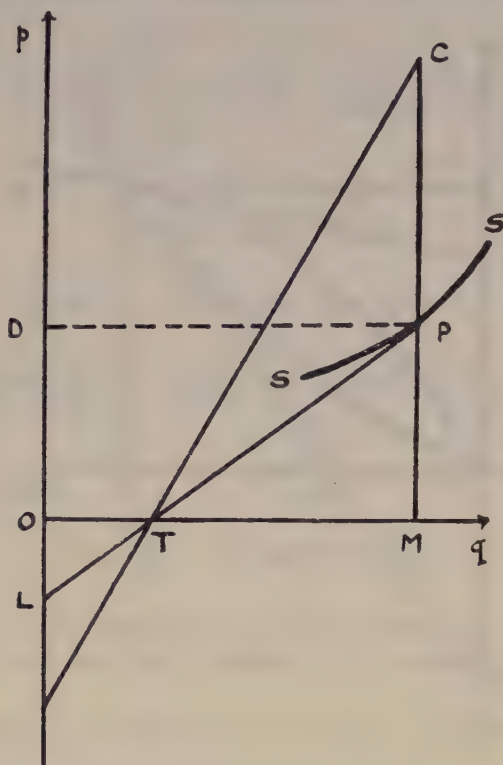


Fig. 11

Elasticity of supply at price P is equal to

$$\frac{OD}{DL} = \frac{MP}{CP} = \frac{\text{Average Supply Price}}{\text{Marginal Supply} - \text{Average Supply Price}} \text{ as before.}$$

THE MARSHALLIAN OFFER CURVES.

The Marshallian demand curve showing on the Y axis the amounts of G -bales offered in exchange for various amounts of E -bales provides us with an integral or offer curve which represents both the demand of country G for the products of country E at different prices and also the amounts of G -bales which country G will offer in exchange for given quantities of E -bales. In Figure 12 the curve OZ represents the quantities of wheat offered in exchange for various quantities of copper. Mr. Lerner has shown¹

¹ A. P. Lerner: "The Diagrammatical Representation of Elasticity of Demand," *Review of Economic Studies*, Vol. I, No. 1.

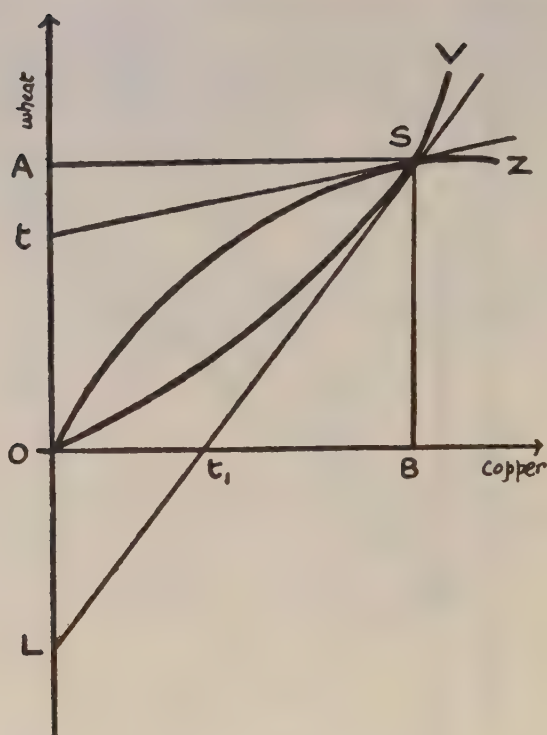


Fig. 12

that by using the relationship $e_d = \frac{\text{price}}{\text{price} - \text{marginal revenue}}$, the elasticity of demand for copper can be measured by $\frac{OA}{Ot}$, where St is the tangent to the curve at S and $\frac{OA}{OB}$ is the wheat price of copper. It is possible to derive the elasticity of supply in exactly the same way. Let e_s^w represent the elasticity of supply of wheat. Then assuming a positively inclined supply curve

$$e_s^w = \frac{\text{average supply price}}{\text{marginal supply price} - \text{average supply price}}$$

Since the supply price of wheat $= \frac{OB}{OA}$ and the marginal

$$\text{supply price} = \frac{AS}{At} = \frac{OB}{At}$$

$$e_s^w = \frac{\frac{OB}{OA}}{\frac{OB}{At} - \frac{OB}{OA}} = \frac{OB}{OA} \cdot \frac{OA \cdot At}{OB(OA - At)}$$

$$= \frac{At}{OA - At} = \frac{At}{Ot}$$

Now the elasticity of demand for copper $e_d^c = \frac{OA}{Ot}$

and the elasticity of supply of wheat $e_s^w = \frac{At}{Ot}$

$$\therefore \frac{e_d^c}{e_s^w} = \frac{OA}{At}$$

$$\therefore e_d^c = \frac{OA}{At} \cdot e_s^w \text{ and } e_s^w = \frac{At}{OA} \cdot e_d^c$$

Similarly if OV represents the offer curve of holders of copper for wheat, the elasticity of demand for wheat

$e_d^w = \frac{OB}{Ot_1}$ and the elasticity of supply of copper $e_s^c = \frac{Bt_1}{Ot_1}$

$$\text{then } e_d^w = \frac{OB}{Bt_1} \cdot e_s^c \text{ and } e_s^c = \frac{Bt_1}{OB} \cdot e_d^w$$

This is, in fact, another form of the purely algebraical formula $\eta_1 + e_1 = -1$ given by Professor Pigou in his *A Study in Public Finance* or $e_g^d = -(e_g^s + 1)$ given by Professor Viner in his *Theory of International Trade* (page

539, note 11). Geometrically this formula is $\frac{OA}{Ot} = \frac{At}{Ot} + 1$

$$\therefore \frac{OA}{Ot} = \frac{At + Ot}{Ot} \text{ and } OA = At + Ot$$

It can be seen easily from the diagram that if the elasticity of demand for copper e_d^c is unity $OA = Ot$, $At = 0$ and the elasticity of supply of wheat = 0. If the elasticity of demand for copper is less than unity the elasticity of supply of wheat will be negative.

When e_d^c is less than unity OA becomes less than Ot and e_s^w is negative. The formula then becomes $\frac{OA}{Ot} = \frac{-At}{Ot} + 1$

$$\therefore \frac{OA}{Ot} = \frac{Ot - At}{Ot} \text{ and } OA = Ot - At.$$

TAXES ON FOREIGN TRADE.

The effect of an import duty on the terms of trade depends on the elasticity of demand for imports and the elasticity of supply of imports. In *A Study in Public Finance* Professor Pigou introduces a formula which shows what proportion of the total tax will be paid by the foreigner. If R is the yield of the tax then the contribution

paid by the foreigner will be equal to $\frac{e_d^c}{e_d^c + e_s^c} \cdot R$ (using our

notation), provided that the offer curves are straight lines over the relevant range. This can be represented easily in geometrical form.

1. Assume e_d^c and e_s^c are both greater than Unity.

$$\text{In Figure 12 } e_d^c = \frac{OA}{Ot} \text{ and } e_s^c = \frac{Bt_1}{Ot_1} = \frac{OA}{OL}$$

$$\text{Therefore the proportion paid by the foreigner} = \frac{\frac{OA}{Ot}}{\frac{OA}{Ot} + \frac{OA}{OL}}$$

$$= \frac{OA}{Ot} \cdot \frac{Ot \cdot OL}{OA(Ot + OL)} = \frac{OL}{OL + Ot} = \frac{OL}{Lt}$$

2. Assume e_d^c is less than Unity.

$$\text{In Figure 13 } e_d^c = \frac{OA}{Ot}, e_s^c = \frac{Bt_1}{Ot_1} = \frac{OA}{OL},$$

$$\begin{aligned} \text{Therefore the proportion paid by the foreigner} &= \frac{OL}{OL + Ot} \\ &= \frac{OL}{Lt} \end{aligned}$$

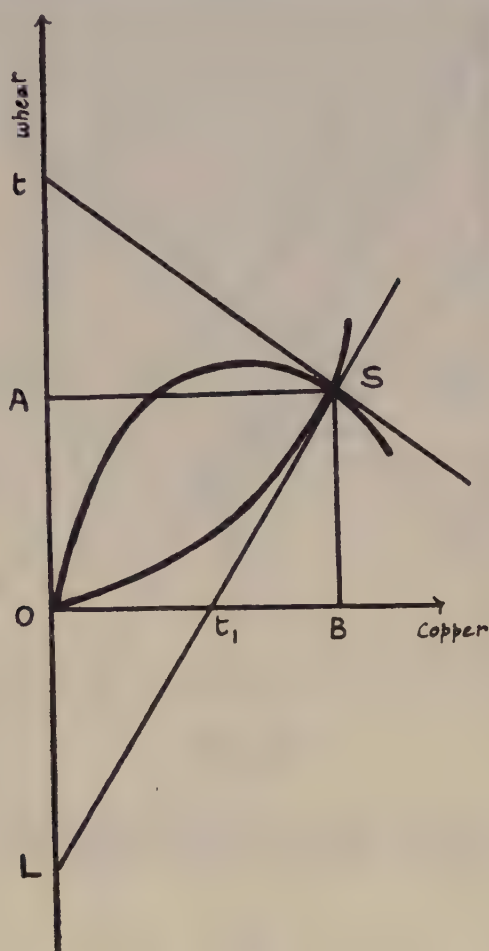


Fig. 13

3. Assume e_d^c is less than Unity and e_s^c is negative.

$$\text{In Figure 14 } e_d^c = \frac{OA}{Ot}, e_s^c = -\frac{Bt_1}{Ot_1} = \frac{-OA}{OL}$$

$$\begin{aligned} \text{Therefore the proportion paid by foreigners} &= \frac{OL}{OL - Ot} \\ &= \frac{OL}{Lt} \end{aligned}$$

which is greater than Unity.

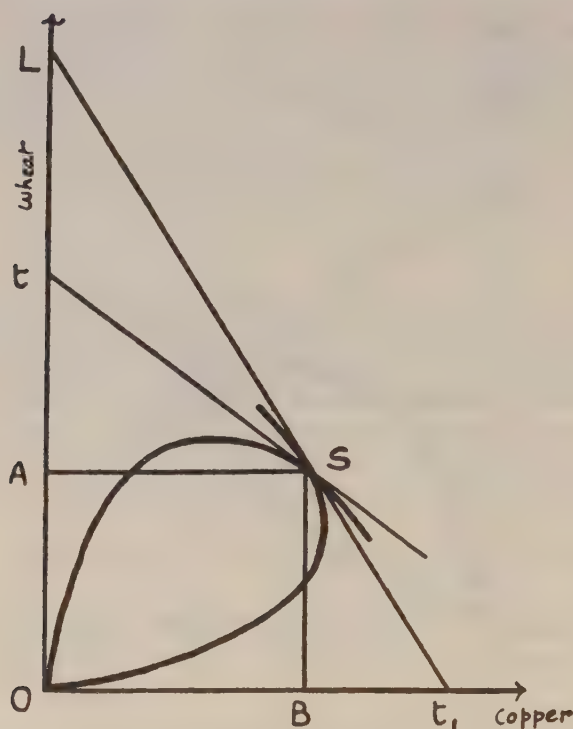


Fig. 14

If $e_d^c = \infty$, $Ot = O$ and the foreigner pays all the tax.

If $e_d^c = 1$ and $e_s^c = 1$ then $OA = OL$ and $Ot = OA = OL$ and

the proportion paid by foreigners $= \frac{OL}{OL + OL} = \frac{1}{2}$.

Given the elasticity of demand for imports, the proportion of the tax yield paid by the foreigner will be greater the less elastic is the supply curve. This can be seen easily from the diagram; for Ot is given, while OL is greater the less elastic is the supply curve of imports. If the

elasticity of supply is negative then $\frac{OL}{Lt}$ is greater than

unity and the foreign country not only pays the whole of the tax but also sells its goods more cheaply in terms of the taxing country's exports.

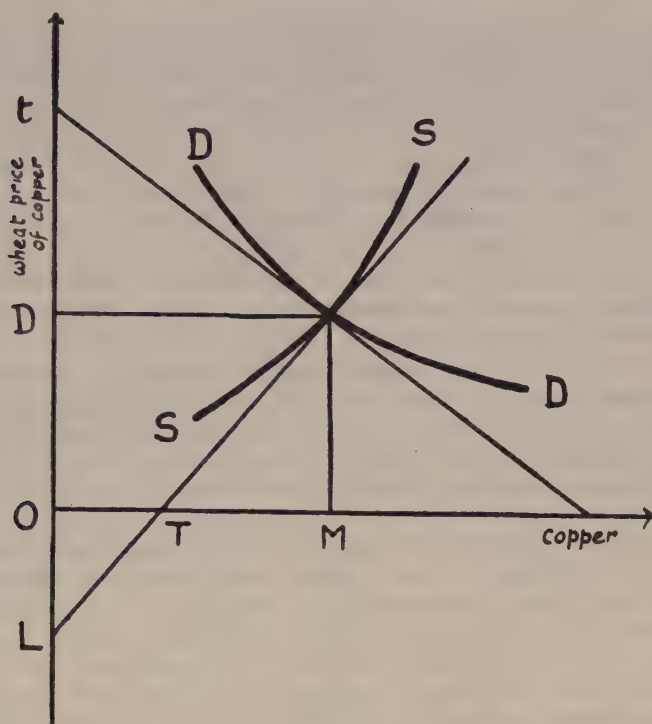


Fig. 15

It is possible to obtain the same simple geometrical relationship showing the effect of a tax when ordinary unit supply and demand curves are used. This is shown in Figure 15.

$$e_d = \frac{OD}{Dt} \quad \text{and} \quad e_s = \frac{TM}{OM} = \frac{OD}{DL}$$

Therefore the proportion paid by the foreigner

$$= \frac{\frac{OD}{Dt}}{\frac{OD}{Dt} + \frac{OD}{DL}} = \frac{DL}{Dt + DL} = \frac{DL}{tL}$$

Book Reviews

Wages and Income in the United Kingdom since 1860. By A. L. BOWLEY. Cambridge University Press. 1937. xix + 151 pp. 8s. 6d.

For the writer of this notice to attempt a review, in the sense of a technical criticism, of Dr. Bowley's latest publication would be merely impertinent. Even among professional statisticians, *a fortiori* among general economists, there are very few qualified to do that. Among persons over the age of—no, I will not name the age at which omniscience ceases!—there are very few who would even think themselves so qualified. My task is a much humbler one: on my own behalf and that of many others to congratulate and thank the author. It is a great privilege to be allowed to do this, more especially to be allowed to do it in the *Journal of the School* on which Bowley's name, over so long a period, has shed an unique lustre.

When I was an undergraduate there stood in the economico-statistical firmament one star only of the first magnitude—the late Sir Robert Giffen. Marshall, of course, knew well the value of and need for statistical information, and was always asking for more. But it was his task to use that material, not himself to gather and digest it. In that field Giffen reigned supreme. But the young generation, equipped with a mathematical technique of which Giffen knew nothing, was knocking at the door. The young generation was A. L. Bowley. Even so, in the domain of wage statistics it was not through mathematics that he made his mark. It was through the invention of a device—a device, which, once explained, looks as though anybody might have thought of it, but of which in fact, before Bowley, nobody did think. We are given a number of lists of wages, each covering a short term of years, and compiled upon unknown and, it may well be, divergent plans. If we assume that each separate list is built throughout on the *same* plan, and if the lists overlap, it is possible to construct from them a single series in the form of a continuous table of index numbers. This new idea, simple as it is, and as path-breaking ideas often are, has opened the way to an enormous advance in our knowledge of wage history. I remember well the enthusiasm with which Marshall spoke of it and of its author.

In this book Bowley has sought to “bring into a coherent whole the investigations that I have made on the subject of wages and income at various dates during the past 40 years.” (p. 1). The stress

throughout is not on absolute figures for particular dates, in which inevitably there is something arbitrary about definition and classification, but on the measurement of change. For, as is well known now, but was far from well known forty years ago, *differences* between quantities can often be estimated with far greater accuracy than can the quantities themselves. The chapter headings, under which these studies are grouped, are (i) The course of average wages; (ii) Real wages; (iii) Average earnings and their distribution; (iv) Earnings and needs; (v) The national wage bill; (vi) The national income. These chapters occupy a hundred pages and are followed by five Appendices and a bibliography. Attention may be called especially to Appendix D, which, under the modest heading "Notes on Retail Prices," contains an important and authoritative discussion of the problem of estimating, on the basis of the scanty data that are available, variations in the "Cost of Living" over a long period of years.

The tables in which Bowley's principal results are brought together have for the most part already been published in his various articles and papers; though some of them are here slightly amended, and some series have been brought up to date. To economists their presentation together under a single cover is bound to prove extremely useful. We are not competent to criticise, but we often need to use them. The many warnings that are scattered through the book should save us from using them for purposes for which they are unsuited and should force us to remember, what some are perhaps prone on occasions to forget, that estimated numbers are not clear-cut entities but, rather, central points surrounded by an area, sometimes narrower, sometimes wider, of probable error.

There is an allied matter which Bowley stresses more than once. For the highest class of statistical work machinery and mathematical technique are not enough. Investigation in this field is an *art*, in which the intuitions of trained experience can never be dispensed with, no matter what manipulative ingenuities are at our command. An experienced mountaineer is able, or should be able, to judge whether or not a particular snow-slope can be safely traversed, but he would be hard put to it to give his reasons. The experienced statistician is often in like case. "There are many checks, of a kind not easily expressed in numbers, which a statistician can bring to bear on estimates which in less experienced hands would be mere guesses" (p. 140). Again, more especially of wage statistics: "It is clear that a minute study of the material, which is of many different kinds, is necessary before any generalisation can be reached. In the end a great deal depends on personal judgment of the validity, appropriateness, and accuracy of the data. No exact statistical justification can be shown for the details included, and the elaboration of formulæ does not remove the elements of approximation in the data" (p. 4). That is a characteristic of their work that all would-be statisticians would do well to bear in mind.

This reflection leads on directly to another—one which no reader of a Bowley's book can fail to carry away from the study of it. However inexperienced he may be, he will realise, if he has not done so already, how great is the mass of detailed enquiry which practical work in economic statistics entails, and how serious are the difficulties, as regards definition and classification, which frequently have to be overcome before a table with a clear and unambiguous meaning can be drawn up. Consider this problem. "A workman moves from a small provincial town, where rents and rates combined are, say, 8s., to a smaller tenement in London, where the combined payment is 12s. Some persons would regard the additional 4s. as worth while, since they value the company and resources of London more than provincial life. If so, there would be no rise in the cost of living owing to the transference. On the other hand, some persons regard rent and rates simply as deductive from their income and, to preserve equality, wages would have to be raised by any addition to rent and rates. It is seen that there can be no certain way of measuring the effect of rates in the changing costs of an unchanged standard" (p. 29). Consider again the table on p. 64, where the percentages of persons in the *New Survey of London Life and Labour, 1929-30*, below the poverty line, as calculated on different bases, are set out. "We have thus 26 or more estimates, varying from 3.3 to 13.4 per cent., of the proportions in poverty, any one of which might be quoted legitimately if accompanied by a definition of the scope and method. It is evident that great care is necessary, in making comparisons in place or time, to secure uniformity of definition" (p. 64). Indeed it is very evident. Indeed workers in this field must be men of an almost superhuman patience!

But patience is not enough; patience and skill together are not enough. Above all, this class of work demands a very special intellectual integrity. When a statistician is asked, as he often is, for figures bearing on some current or historical issue, he is under a strong temptation, by hook or by crook, somehow to provide them. But often the data are such that they cannot be provided, or, more exactly, that they cannot be provided without a margin of error so wide that they are little better than guesses. Such guesses, useful perhaps for some purposes, are highly dangerous for others. They are especially dangerous when used as a basis for correlations and for causal inferences drawn from these. It is up to the statistician, therefore, not only to devote immense care and labour to the figures that he sponsors, but also, so to speak, always to decry his own wares, advertising not so much what they can as what they cannot do.

To read Bowley's book is to be given an object lesson in these virtues. In this single-minded search for truth, this avoidance of all sensation, this overcoming of many obstacles and frank recognition of others that cannot be overcome, there is an austere but compelling beauty. Economists and statisticians alike are under a heavy debt

to Dr. Bowley (I ask pardon for allowing him his doctorate only at the beginning and end of this notice) not merely for the yield of his researches, massive and imposing as these are, but also, perhaps even more, for the *manner* in which he has conducted them, and for the high standard that he has always set alike for himself and others. May the torch be carried on!

A. C. PIGOU.

The Economics of Inflation. By Constantino Bresciani-Turroni. Translated by Millicent E. Sayers, with a foreword by Lionel Robbins. Allen and Unwin. 1937. 464 pp. 25s.

It is a matter for great satisfaction that, thanks to the enterprise of the Halley Stewart Trust and other persons, this monumental study of the decline and fall of the German mark has now become available in English. Founded on personal observation and enquiry as well as on elaborate documentation from official and unofficial sources, and ordered by theoretical acumen and social insight, the book will long stand as a masterly record and interpretation of the most spectacular episode in the history of the world's monetary affairs.

The first half of the book is concerned with the analysis, period by period, of the mutual relations of the conspicuous phenomena of the inflation,—the growth of the floating debt and of the note issue, and the rise in the prices of foreign exchange, of foreign goods, and of the various categories of home-produced goods and services. On the vexed question of causal sequence the author's judgment is firm and uncompromising. It is true that during certain phases the external value of the mark fell more rapidly than the internal, and that some of its spectacular plunges must be connected with "autonomous" events and not with any immediately preceding burst of currency expansion. It is true, too, that when in the final phases of the catastrophe the external and internal values came together again, it was because the latter came to be immediately adjusted to the former through the growing habit of reckoning in gold values, ending in the virtual "rejection" of the local standard of value. And it is true, finally, that the rise in internal prices thus generated provoked both a further increase in the issue of Reichsbank notes and that speeding-up in their velocity of circulation which caused their total real value progressively to decline, and so, by revealing a "shortage of money," stimulated the creation of substitute moneys of various kinds. Nevertheless, *in the sense that most matters*, the causal sequence must be pronounced to start with the note issue and to end with the exchanges. Or rather, it must be pronounced to start with the budget deficits financed by the discounting of Treasury Bills with the Reichsbank for new notes. For not only did these new notes directly provide continuous fuel for the flight of capital over the exchanges: the

key to the whole causal tangle must be sought in the consideration that, as the event ultimately proved, the whole complex cumulative process could at any time have been stopped and reversed if the determination of the authorities to restore the public finances and control the money supply had been placed beyond a doubt.

In hammering in this side of the truth, Professor Bresciani-Turroni deals as they deserve with the naïve sophistries of those Helfferichs and Havensteins by whom it was so long denied. He deals, too, as they deserve with those powerful and sinister influences which, acquiring a vested interest in the depreciation of the mark, opposed their whole strength to a drastic treatment of the disease. But does he deal as they deserve with those victorious Powers whose blind rapacity helped to impose on the leaders of the young Republic a task so manifestly beyond their strength? I for one feel that he does not, and that in this single but important respect his book lacks balance and fails of achieving the definitive picture of the events which it records. "I willingly admit," he says at one point, "that the Treaty of Versailles created psychological influences unfavourable to the mark". Surely that is almost as though a historian of more recent events were to record that the rise of National Socialism "created psychological influences unfavourable" to the Jews!

From causes Professor Bresciani-Turroni turns to consequences, and in a series of penetrating chapters analyses the effects of the inflation on the volume and character of production, on the structure of industry, on the financial position of various types of enterprise, on the distribution of wealth and income between social classes and on the broader aspects of social and political life. He gives it due credit for the stimulus afforded to employment during the world depression of 1920-1, and due blame for the distortion of productive activity ("Germany offered the grotesque, and at the same time the tragic, spectacle of a people which, rather than produce food, clothes, shoes and milk for its own babies, was exhausting its energies in the manufacture of machines or the building of factories"), and for the ultimate collapse of employment and production in 1922-3. The depression of real wages, the ruin of the intelligentsia, the birth of industrial monstrosities of the type associated with the name of Stinnes, the "process of continual centralisation of the social income by a small minority of inflation profiteers," the consolidation of "the dictatorship of heavy industry—an industrial feudalism pitted against the nation,"—all are depicted with a wealth of illustrative detail and a remorseless pen.

An account of the monetary reform of November, 1923 ("the miracle of the rentenmark") fitly brings the main narrative to an end. But the epilogue on the post-stabilisation crisis, continued in an appendix which carries the story on to the crisis of 1931, contains some of the most valuable material in the book,—material which will bear much reflecting on by students of the theory of industrial fluctuation.

I can here do no more than call attention to the illuminating discussion (pp. 359-69) of the nature of the "shortage of capital" whose existence was revealed after the stabilisation, and of the different fortunes experienced in the ensuing years by different groups both of consumption goods industries and production goods industries (pp. 376-83). May these latter pages, and especially the often-neglected distinction drawn on p. 383 between cases where the dependence of constructional activity on consumption activity is direct and intimate and cases where it is remote and speculative, be earnestly studied by all those who feel the allure of a simple schematic treatment, in terms of Multipliers and Acceleration Principles, of very complex relations!

The translators have performed an exceedingly laborious task with few blemishes save a chronic tendency to misuse the English word "even" (pp. 66, 88, 210 n.). On p. 48, line 22, and in three obvious places on p. 53, "millions" should be "milliards".

D. H. ROBERTSON.

Wages, Cost of Living and National Income in Sweden, 1860-1930.

By the Staff of the Institute for Social Sciences, University of Stockholm.

Volume III, *National Income of Sweden, 1860-1930*. By ERIK LINDAHL, EINAR DAHLGREN and KARIN KOCK. London: P. S. King and Son. 1937. In two Parts, 319 and 631 pp. 15s. and 20s.

The first two Volumes in this series, on "Cost of Living" and "Wages" respectively, were reviewed in *ECONOMICA* (1934, pp. 373-5). The high standard reached in the former Volumes is fully maintained in this. Enormous industry has been devoted to the assembly of all materials bearing on the subject, they are scientifically and critically handled, and their validity is continually tested by comparison of the results of different hypotheses. But even the statisticians of Sweden cannot make statistical bricks without straw, and in the period before 1896 the relevant information is so incomplete that only the general tendency can be held to be established. Again and again it has to be assumed that the movements of the unknown have been proportional to those of the known, the proportion being assigned by the data of a later period. Since, in spite of the continual cautions given, there is no doubt that the series for the whole seventy years will be quoted as established on reasonably good evidence, it would have perhaps been better not to attempt a complete estimate of income in the first half of the period covered, but only to have given those series which are based on direct evidence without combining them into a total.

As there are no statistics of income which can be used, at least till recent dates, the estimate is made by assembling statistics of production. Such statistics as there are for production are usually

in the first instance of quantities which have to be valued by data derived from other sources. The results are the values of gross output, and a great deal of very careful work is devoted to eliminate duplication; the direct method used in the British Census of Production of subtracting the value of materials, etc., to obtain the value of Net Output in each industry is frequently not possible, and ingenious devices are employed to subtract all debit items before the final Total Income is given. The result is that we do not know the net output in many classes.

The nature of the results reached may be shown by the following extracts from Table 48:

NATIONAL INCOME. ALTERNATIVE I. MILL. KRONOR.

	<i>Year</i>	
	1896	1930
Agriculture, Forestry, etc.	475	1095
Manufacture, Mining and Handicrafts . .	415	3389
Transport and Communications	88	648
Commerce, Professions and Public Administration	371	2270
Paid Domestic Work	35	140
Services of Durable Consumers' Goods . .	202	1102
TOTAL	1586	8644
<i>Less—</i>		
Joint Debit Items	59	459
Raw Materials and Services for Building	59	441
NATIONAL INCOME	1468	7744
National Income including unpaid domestic work	1758	9324

The subtractive part consists of the estimated values of duplications, which it was impracticable to allot to separate industries.

There is the familiar difficulty, unavoidable when income is estimated on the basis of production, of valuing services, whether in distribution or the professions. The former is found by a rather arbitrary percentage on the value of output. As regards its validity it is remarked that the agreement with certain estimates in the Population Census of 1930 is sufficiently close, and that "the conclusion is justified that the order of magnitude of the gross income of commerce as here computed is acceptable". Nevertheless "The income figures may, however, be too high, as the estimated proportion of marketed agricultural products is possibly on the high side." It may be added

that the assumption that the same proportion of distributive to original costs obtained throughout the period is hardly justified, though there is no means of correcting it. "There is no possibility of expressing *a priori* an opinion on the changes that may have occurred in the ratio of distribution costs to production costs."

Since the material for Great Britain, prior to the Census of Production of 1907, is at least as imperfect as that for Sweden, we are not encouraged to attempt any similar estimates of National Income here on the production side for earlier dates. After 1907, however, the possibilities are greater and a study of the detailed methods described in Part II would be very helpful for such an attempt.

In Table 52 the National Income is corrected for changes in prices and given "in stable value of money." There is hardly sufficient discussion of the formation of the relevant index-number. We suggest an alternative method, which it is to be hoped that the authors will examine, namely that used in constructing an index-number of production, where the series of physical quantities are weighted by the value of net output in one or more chosen years.

The first Chapter of the book is devoted to a very careful examination of the Concept of National Income and the methods of estimating it, which leads to a description in Chapter II of the methods followed in the investigation. The treatment of rates and taxes paid by producers or distributors is one of the major difficulties in the definition of income. In England Sir A. Flux omitted the salaries of civil servants (*Statistical Journal*, 1929). The last Census of Production in its Summary of Preliminary Results (*Board of Trade Journal Supplement*, 23rd December, 1937) excluded Excise but included the Sugar Subsidy in the Net Output. Mr. C. Clark adds all direct taxes to personal incomes. It is not quite clear how excise is treated in the method actually followed in the Swedish calculation, though no doubt careful examination of the details would answer the question; but in the explanation of the method of summing wages and interest, rejected for want of data in Sweden, we find the following (on p. 19):

"The contributions to the national income from the agents of production employed in private production processes should be calculated, inclusive of all rates and taxes paid, but with a general deduction for the costs to the State of promoting private production. But as income paid out by the different industries to the owners of agents of production is usually reckoned, that deduction is more or less formally determined, all rates and taxes paid directly out of the income received by each individual being included, but not those (excise dues and the like) that are of the nature of manufacturing costs."

The obscurity of this passage reflects the difficulty of the problem, which is accentuated the more Central or Local Authorities engage in productive or distributive enterprises.

A. L. BOWLEY.

Lament for Economics. By Barbara Wootton. George Allen and Unwin, Ltd. 1938. 322 pp. 6s.

Mrs. Wootton writes in a very stimulating, clear and, at times, amusing manner. Much of what she has to say about the intractable nature of economic phenomena, the dangers of abstract reasoning and the difficulty of normative judgments will command the assent even of those who are the targets of her attack. It is a pity that in her title, and sometimes in her text, she has not always been able to resist the temptation to exaggeration and some hardly fair quotation. The sections of the text in which she is most critical of "economists," in which term she sometimes includes all students of economics (though elsewhere she singles out for opprobrium only the "analytical economists," and in places only Mises and Robbins), bristle with such expressions as "seems to suggest," "liable to be understood," "leave such inferences open," "lurk under an implication". This "seems to suggest" that she is in fact attacking a bogey largely of her own imagination. The economic literature that she does not cite, together with the somewhat naïve concluding suggestions as to the way in which economists ought to work, further "seems to suggest" that she is more familiar with the pure theory she criticises than with the realistic studies she advocates. For example the only one of the many publications of the League's Economic Intelligence Service that is quoted is Haberler's analytical study of business cycle theories. It is true that the currency question posed on page 79 is incapable of a general answer; but it is also true that the Belgian economists produced a remarkably accurate answer to a very similar problem when the belga was devalued, while their Swedish and Australian colleagues have proved equally accurate in their estimates and calculations. The experience of those economists who have worked in realistic problems, moreover, is that a severe theoretical training gives a more useful preparation for grappling with practical calculations than does a hazy general knowledge.

The true gravamen of Mrs. Wootton's attack lies in her distrust of those economists who refuse to commit themselves to reformist social schemes but draw a clear line between their rigorous reasoning on hypothetical bases and their speculations about social objectives. This distrust is in sharp contrast to the approval bestowed on "socialist economists" or "neo-individualists". It is possible, however, to share Mrs. Wootton's preference for the term "political economy" as distinct from "economics," and to have devoted oneself mainly to realistic economic studies, with excursions into "ends" as distinct from "means," without feeling called upon to discriminate between the many kinds of fruitful studies that different economists undertake. The field of study is wide. There is room in it (as Mrs. Wootton indeed admits) for those who sharpen the theory applicable to specific hypotheses (socialist or individualist) as well as for those who try to analyse and describe accurately the very tangled processes of economic

activity, and for those who formulate programmes of reform or consider the purposes of economic activity. Indeed there are few economists who do not attempt at one time or another to work in different parts of the field. The analytical economists who are frequently cited as typical of those elsewhere described as "distinguished, not so much by their interest in, and attention to, phenomena, as by their indifference to, if not their contempt for, many of the laborious observations undertaken by their more wordly colleagues" happen to be particularly active workers in the field of current observation. Mrs. Wootton ought really to do some realistic investigation of this subject before embarking on generalisations deduced from hypotheses based on partial reading.

J. B. CONDLIFFE.

Some Modern Business Problems. Edited by ARNOLD PLANT. Longmans, Green and Co., Ltd. 1937. viii + 336 pp. 7s. 6d.

The activities of the entrepreneur and the interests of the empirical economist come into the most direct contacts at two points; in the framing of market and investment policy and in the devising of a technique of industrial administration. The guidance which can be accorded to the business man differs in kind as between these two heads for, whereas in the one case findings may reach some degree of finality, in the other, by their very discovery, facts tend to render themselves untrue. For a concern with a given magnitude and character of output, there is probably one best form of internal organisation and administration and it should be possible to lay bare those principles which would lead the entrepreneur in the right direction. Certainly the optimum internal arrangement of one business is not, directly at least, a function of the administration policies of other businesses. But this is not true when the economist turns to marketing or investment policy. The wisest policy for any one business man turns largely upon the present practices of other business men and a student of business problems, by revealing to business men their own actions and some consequences of these, may provide them with good reasons for modifying their policies. One outstanding illustration of this is that so soon as the business man becomes conscious of trade cycle movements and the dangers to himself of excessive expansion in a boom, the caution which this induces modifies, in degree if not in kind, the cyclical movement itself.

The essays in this admirable symposium may be divided into two groups; those in which positive direction, in the form of principles, may be given to the entrepreneur and those in which the analysis is more abstract and the distillation of policy from theory more elusive and risky. In the first group Professor Plant and Mr. Wilson discuss the general internal structure of a business by going back to first principles, taking nothing for granted, and steadfastly refusing

to be side-tracked by the mass of detail in which so many treatments of this subject become hopelessly bogged. Reading these two essays it is possible to believe that, ultimately, a science of administration may be created, the principles of which will apply with equal truth to the administration of a business, an army, a university, a church, a trade union, a government department, or a county borough. Mr. Wilson also has a skilful chapter on Public Relations Departments, although here it may be doubted whether the intrinsic importance of the subject really merited such analytical ingenuity and expository skill. Four essays are concerned with the manner in which businesses can best mobilise quantitative information in the search for maximum profits. Mr. Brown, in essays on Market Research and Operating Efficiency, neatly pins down the formidable obstacles in determining why the consumer acts as he does and in replacing the qualitative impressions of the technical man on the spot by comparative measurement of the efficiencies of different departments, plants or concerns. But the most novel work here is that of the two accountants. Mr. Rowland gives us that badly needed but rarest of things, a study of accounting technique in the light of economic concepts. His discussion of valuation of stock and of depreciation allowances must surely lead to a more realistic attitude among accountants. Mr. Edwards is critical of the rigidity of the double entry system and the undue importance attached to the balance sheet whilst he stresses the value, in cost accountancy technique, of the economic concept of marginal cost and revenue.

Mr. Paish and Mr. Shone share the other field in which the expectations of the business man remain as the fascinating and terrifying imponderable in any estimate of the probable course of affairs. Mr. Paish, in his essay in Forecasting Foreign Trade, shows what can be done, in appropriate circumstances, in anticipating changes. But it is seriously to be doubted whether this kind of work will ever be the function of the business man. It is usually not so much a question of *how* the method of forecasting is applied as *when* the conditions are appropriate for its application, and for this nothing short of the skill, knowledge and quite unteachable flair of a Mr. Paish is sufficient. Mr. Shone's analysis is even more spectacular, for it was left to him to discuss the relation between business policy and the varying durability of commodities. His treatment of the relation between "replacement" and "additional" demand and his examination of the influence of the rate of interest on the durability of goods produced, are models of lucid exposition. But these new tools of thought must for the moment take a secondary place in the making of practical decisions. For example, Mr. Shone uses, as an apt illustration of the relation between stocks and increments, the problems raised in the supply of new teachers by the secular decline in the number of school children. But any Director of Education would probably find it much more necessary to think in terms of possible future changes in the school

leaving age, the size of classes, the geographical distribution of the population, the modifications of curriculum. And is the chocolate manufacturer or the manufacturer of chocolate machinery really being very farsighted when he becomes alarmed by the prospects of the future decline in population? Might not the chocolate manufacturer equally legitimately expect an increase in consumption per head with the rise in national income? And if he fears a fall in aggregate consumption (and therefore production) why should he also fear the decline in the supply of labour? In any case, in an industry where technical changes have been going on so rapidly, surely further technical changes would meet the difficulty of a shortage of labour? So far as the manufacturer of chocolate machinery is concerned, would not the decline in population, leading to a reduced labour supply, positively help him? And, thinking over a period, would not the general trend in technical methods be much more important than changes in the aggregate demand for chocolates? A second thesis, that there is an inverse correlation between rate of interest and durability, will also command great attention. Theoretically, the proposition stands, and Mr. Shone suggests that house building pre-war (when the rate of interest was 3 per cent.) and post-war (with a rate of interest of 5 per cent.) is an illustration. Is it true that the post-war jerry-built houses are less durable than the pre-war houses built in the present slum areas? Even if our post-war houses are less durable, our post-war electric batteries, stainless steel weapons, motor car tyres, etc., are much more durable. In any case, there appear to be other, perhaps over-riding, factors at work determining durability. Technical progress makes it possible to adjust means more delicately to ends. Primitive man, who made a boat by hollowing a log, made a much more durable commodity than a modern racing motorboat, not because of rates of interest but because he couldn't make anything else. Consumers may attach importance to non-durability because this means variety. And when the community becomes more generally aware of technical progress its valuation of durability falls as its calculation of obsolescence risks is refined.

But the queries raised by this volume are merely an index of its stimulating power. The London School of Economics has, in the past, followed a wise policy, and established a useful example, by its insistence upon the grouping together of the various branches of the social sciences. It is clear that this new Department of Business Administration, with Professor Plant and his colleagues, is to add much to the scientific grasp of practical affairs and to the strengthening of economic science which will come through it.

JOHN JEWKES.

Some International Aspects of the Business Cycle. Hans Neisser. University of Pennsylvania Press. 1936. 176 pages. \$2.50.

The late Professor Cannan used to plead for a simplification of our science. Not so the author of this book, whose parting words

are ". . . we cannot help feeling the need for more complicated economics". If Professor Neisser's latest work is likely to cause the reader some bewilderment at a first reading on account of its very complication, this is very largely because it descends from the plane of abstraction and comes to grips with complex reality. Still, had the argument been simpler and more definitely organised, the trees less luxuriant, and the wood more clearly demarcated, this would have been an easier book to review.

Professor Neisser sets out "to describe theoretically the forms in which the phases of the general business cycle express themselves if we take account of the narrower boundaries of a national economy" (p. 1). His theoretical apparatus, as expounded in an introductory chapter, the reviewer found to be rather a stumbling block than an aid to understanding. Take, for example, the central concept of Overproduction. This is described (v.d. p. 4) as the state which prevails in an industry where marginal producers are failing to cover their costs. But whether costs are considered *ex post* as sums actually disbursed in the process of production, or *ex ante* as payments required to ensure the continuance of production—and, in the course of this book, the author employs at times the one, and at times the other interpretation—the particular importance attached to marginal producers is unjustifiable. The argument of subsequent chapters, however, seems to suffer little if costs are taken to mean the average costs of all producers.

The crux of the book lies in the treatment of the problems of general overproduction (or net deflation) and recovery. In this connection Professor Neisser makes considerable play with the concepts of Under- and Oversaving, by which he designates overproduction limited to capital goods' industries and consumers' goods' industries respectively. Under the more familiar titles of Overinvestment and Underconsumption these concepts have long disputed the field of business cycle theory. It seems doubtful, however, if they remain applicable when we leave behind the closed economy and "take account of the narrower boundaries of a national economy". If, to take a case upon which the author lays some stress, German heavy industry suffers because of the drying up of capital imports into that country, it is confusing to call this an undersaving situation in Germany.

The chief point of interest in the chapter on "Undersaving" lies in the illustration of Germany's dependence for domestic prosperity in the years following the mark stabilisation upon factors operating by way of the balance of external payments, and, in particular, on the highly unreliable item of capital imports. From the figures quoted it is apparent that the ratio of imports to income is so variable that it is hopeless to try to deduce a "foreign trade multiplier" from the average figures for this ratio.

While the German experience of 1929-30 is made to stand for an undersaving situation, the United States provides in 1929 the example

of an oversaving situation. A sharp distinction is drawn between the effects of an undersaving and of an oversaving crisis: the former need not involve a general depression provided that creditors and others keep their heads, whereas oversaving, by destroying the profitability of investment in consumers' goods' trades, develops naturally into an all round deflation. In the concrete case, it is the oversaving situation in the United States which is saddled with the main responsibility for the recent world depression. The argument against applying the categories of a closed economy to a single country is, of course, less conclusive in the case of the United States than in the case of Germany. The very strong arguments which Professor Neisser puts forward in favour of this thesis constitute one of the most valuable contributions of the book.

Many other parts of the book merit more than the summary mention which is all that can be given here. The treatment of the spreading of deflation from country to country raises many interesting questions such as that of the relationship of 'autonomous' to 'imposed' deflation. The problems of recovery are perhaps less satisfactorily dealt with. One feels the need of some more systematic discussion of the possibilities and limitations of recovery in a single country, engineered through devaluation or through protectionist measures. There are also two very interesting chapters which stand somewhat aside from the main stream of the argument. One deals with the question of overproduction in agriculture, while the other, under the title of "Structural Unemployment", serves in the main as a peg on which to hang an analysis of the post-war developments in England.

The whole book, rounded off by an appendix on the Neo-Marxist theory of Imperialism, testifies to the breadth of Professor Neisser's knowledge and interests. It is not a book that he who runs may read but those who refuse to be deterred by difficulties which are enhanced by occasional obscurities of style and exposition, will get much new light on a rather neglected subject.

J. M. FLEMING.

Studies in the Theory of Economic Expansion. By ERIK LUNDBERG.
(Stockholm Economic Studies No. 6.) London: P. S. King &
Son, Ltd. 1937. vi + 265 pp. 10s.

This book is an attempt to provide economic theory with a method of analysis suitable for the study of an expanding economic system. Considering the traditional theory of partial and of general equilibrium inadequate for this purpose, the author wants to extend the analysis in two directions: into an analysis of total equilibrium and into a sequence analysis. The latter is the chief purpose of Dr. Lundberg's book. The theory of total equilibrium is concerned with the determination not of the prices and output of particular commodities, as are both the partial and the general equilibrium theories, but of

such aggregate quantities as total income, total consumption, total saving, total capital formation, etc., just like Mr. Keynes' idea of a theory of total output, total employment, etc. But, unlike Mr. Keynes, Dr. Lundberg is not satisfied with an equilibrium theory which determines the aggregate quantities from a system of simultaneous equations. Instead, he takes account of the time-lag involved in the interrelation between the different quantities, the result being not a system of total equilibrium but a *time sequence* in which the variables in the current period are determined by the value of the variables in the preceding period and in turn determine the value of the variables in the next period. Thus, instead of arriving at a position of equilibrium, a "law of development" of the economic system is obtained. Equilibrium theory still remains valid as a study of the interrelations between the variables and particularly as a study of the reactions of the consumers and entrepreneurs to given situations. But while in equilibrium theory all the variables of the system refer to the same moment of time the sequence analysis relates them explicitly to different periods of time. In this way the present appears as determined by the past and in turn determines the future. As a method the sequence analysis of Dr. Lundberg is nothing else than the familiar method of the "cobweb theorem" applied to a system of total equilibrium and to a larger number of variables.

Two problems are involved in the construction of time sequences. One is the selection of the proper unit-period, i.e. the period of time which elapses between two successive values of a variable in the time sequence equations. A considerable part of the book is devoted to a discussion of this problem. The general methodological principle underlying the choice of a unit-period is that no significant changes should happen within the period, since otherwise there would appear effects which cannot be accounted for in the analysis (p. 79). With a view to selecting a proper unit-period Dr. Lundberg discusses the various theories which involve an analysis of time sequences. Thus Wicksell's theory of the cumulative process, Keynes' "pure theory of the credit cycle," Robertson's condition for a smooth expansion, and the constructions of Johansson and Hammarskjöld are discussed (Chapter III). The English-speaking reader will certainly appreciate the presentation of the gist of the arguments of Johansson and Hammarskjöld, whose works are available only in Swedish. The discussion shows the great variety of unit-periods used by the different authors (pp. 85 and 87). Special attention is paid to the type of sequence analysis which is based on the study of the circular flow of money (Chapter V). Here the velocity of circulation and the circulation period of money play a dominant rôle. This type of sequence analysis is repudiated because the circulation period of money has no causal significance. The velocity of circulation is arbitrary, since it depends on what is defined as being money, and

even if "circulating" and idle money are separated, as is done by Hammarskjöld, the circulation period is an *average* and hence has no causal significance. But due to the existence of a credit system such separation of "circulating" money from idle funds is, according to Dr. Lundberg, also quite arbitrary, and the circulation period of money becomes a secondary technical circumstance, having no relation to the *period of income generation* which alone is relevant for the analysis (pp. 128-130). The last-mentioned period depends on the time required by the consumers and producers to react to a change in income and profits (p. 131). Finally, the average time between the rise of demand and the subsequent increase in production activity is chosen as the unit-period (p. 187).

The other problem is that of anticipations. Dr. Lundberg expresses himself very definitely, and in the reviewer's opinion very rightly, against the treatment of anticipations as independent variables. "It is sensible," says he, "to link actions with expectations only if the latter can be explained on the basis of past and present economic events. Total lack of correlation here would mean the complete liquidation of economics as a science" (p. 175). Unless anticipations are linked with past and present events no determinate time sequence would be possible. In the time sequences he constructs Dr. Lundberg assumes throughout that the costs (i.e. the receipts) estimated by the entrepreneurs in each period are equal to the total receipts realised in the preceding period (pp. 191, 200, 209; cf. also p. 218, where the entrepreneurs are assumed to expect the rate of interest at the end of one period to rule in the next period). This is, of course, only one of the many possible ways in which anticipations can be linked with past and present events.

The unit-period being chosen and an assumption concerning the connection between expected receipts and receipts realised in the preceding period being made, the time sequences can be constructed. After a classification of cost items with respect to their income-generating character (Chapter VIII) and having shown earlier that only a part of the costs incurred in a period become income in the same period (Chapter IV), Dr. Lundberg proceeds to construct a series of model time sequences. They are set forth in Chapter IX, which forms the most important part of the book. As is usual with time-sequences, a cyclical fluctuation can be obtained under certain circumstances (i.e. with certain values of the constants in the equations). Very interesting and of great importance is Dr. Lundberg's study of the factors determining the influence of saving (or rather of the propensity to save; the author uses the term "planned savings," cf. pp. 211-212) on investment. An increase in the propensity to save affects investment in a twofold way: it decreases the demand for investment by decreasing (or by checking the increase of) the demand for consumption goods, but on the other hand it lowers the rate of interest and thus encourages investment. The

net effect can be either way. Dr. Lundberg gives a mathematical formula to determine which way it is (p. 228). However, the smaller the annual amortisation quota, i.e. the more durable are the fixed capital goods produced as a result of the investment, the more does the volume of investment depend on the rate of interest and the less is it susceptible to influences coming from the demand for consumption goods. Because of this double effect of saving a check in the expansion and the start of a downward turn of the time sequences may be due *either* to a deficiency in demand for consumption goods *or* to a deficiency of saving which checks investment through a rise of the rate of interest. Thus two types of "crises" are possible: one due to an excess of saving and lack of purchasing power to absorb the increasing output of consumption goods, the other occurring when the demand for investment is governed rather by the rate of interest than by the expenditure on consumption, caused by a shortage of the supply of saving leading to an increase in the rate of interest (pp. 233-234 and 254-256). In an appendix Dr. Lundberg suggests that the expansion in the U.S.A. from 1922 to 1929 might possibly have been of the first type, while the development in Germany during the same period and the business cycles in pre-war times which were connected with constructions of long duration (e.g. railways) might have been of the second type of time-sequences.

Dr. Lundberg states repeatedly that his model sequences are not intended to present a theory of the business cycle, but are only "methodological exercises" intended as illustrations how the analysis can be advanced beyond the equilibrium stage and developed into a theory of time sequences (pp. 170, 180-182, 244-245). Thus it is difficult to criticise the actual contents of the model sequences since the author himself does not regard them as definite. The idea that economic theory should preoccupy itself with a study of time sequences rather than of equilibrium positions is widely agreed upon to-day and has already a small tradition behind it. Walras' doctrine of *tâtonnements* and Hans Mayer's idea of a genetic price theory contained it in nuclear form and it was brought into the limelight by Rosenstein-Rodan, Tinbergen, Frisch and by the whole discussion resulting from the discovery of the "cobweb theorem." Of course, it has always been implicit in any theory of the business cycle. The English-speaking economist should also be reminded that on the Continent there has long existed an analysis of both total equilibrium and time sequences built up around the famous models of "extended reproduction of capital" contained in the second volume of *Das Kapital*. Started by Tugan-Baranowski, continued by a whole series of Marxian scholars and adopted also by economists coming from quite different quarters (for instance by Spiethoff), a whole system of model sequences was worked out as early as 30 years ago and more to study the influence of capital accumulation upon total output and employment, total consumption, the rate of profit, etc.

The thorough and systematic way in which Dr. Lundberg treats the methodological side of the study of time-sequences makes his book an important piece of analysis. The doctrine of the double effect of saving on investment seems to be his most important contribution. However, his treatment of the theory of interest seems rather unsatisfactory. It makes use of the concept of "planned saving" where the amount saved is related to anticipated income (p. 145). The difference between investment and saving thus turns out to be equal to the difference between realised and anticipated income. If the anticipated income is equal to the income realised in the preceding period, but only in this case, the difference mentioned is equal to the increase of income during the period. This treatment, though formally correct, is rather complicated and could be simplified substantially by adopting Mr. Keynes' technique of treating saving simply as an *ex post* "rest." The causal significance of the *propensity* to save and its influence on the rate of interest, which Dr. Lundberg is anxious to preserve in his theory (pp. 224-225), can be taken full account of also when Mr. Keynes' technique is used. This can be done by studying the effect of a change in the propensity to save upon the volume of transactions and the shift of the liquidity preference curves thus caused. The reaction of the rate of interest to a change in the propensity to save depends on the quantity of money and on the shape of the liquidity preference schedule. These factors find no place in Dr. Lundberg's model sequences. His sequences are therefore of very limited validity.

The book makes no easy reading. The argument is rather diffuse and it is not always clear what the author is driving at. The presentation is frequently casuistic. Thus, for instance, Chapter IV would have gained in clarity by the use of some calculus and greater generalisation. The author's argument would stand out much clearer if it were presented in a more straightforward and concise form.

OSKAR LANGE.

Bank of England Operations, 1890-1914. By R. S. SAYERS. P. S. King & Son, Ltd. xxiv + 142 pp. 6s.

Mr. Sayer's theme is the working of the gold standard during the quarter-century which preceded the Great War.

Commencing with a description of the Bank in relation to the Money Market in the '90s, the author proceeds to give you a clear analysis of the methods used by the central institution to enforce the effectiveness of its own rate upon the other banks. He reminds us that such "money market operations" as the purchase and sale of *bills* by the Bank were still unknown in 1910. In order to maintain its control over the brokers the Bank's policy was to rediscount bills which were nearing their maturity. When the market

was free from the Bank, the latter's rate was enforced by reduction of market funds resulting from sales of securities or borrowing by the central institution.

It is of great interest to compare the pre-war methods so clearly set forth by Mr. Sayers with those in use to-day. The co-operation of the clearing banks with the central Bank which he describes is a practice now apparently fallen into desuetude. It seems to have been rather a cumbersome method to use in a market where there existed autonomous discount houses.

Mr. Sayers makes abundantly clear that the working of the pre-war system was far from smooth and the jerkiness of the rate had become so detrimental to trade that efforts were made to increase its efficiency without resort to the extreme measure of raising it.

It is to be hoped that Mr. Sayers will now give us a companion book covering the period 1914-1938. A clear exposition of the manner in which the problem of market control has been solved would be most interesting, the somewhat piecemeal solution of pre-war days having yielded to a systematic policy made possible in spite of (or thanks to ?) the abandonment of the gold standard. The Bank control of the Market has been obtained for several years now through the manipulation of the Treasury Bills in conjunction with the Exchange Equalisation Account.

I have but one minor criticism to offer on Mr. Sayers' book. He has devoted one chapter to the contention that the occasional support granted to the Bank of England by the Bank of France was by no means a spontaneous or generous gesture, but resulted from an awareness of the evil consequences to France of an increase in the English bank rate. This sensitive nationalism is aroused by the suggestion of "a decrepit Bank of England propped up by a fairy godmother, the Bank of France." Surely Mr. Sayers is here going out of his way to pick a quarrel. Measures of international co-operation are never entirely altruistic, but the absence of complete selflessness does not necessarily imply haughty condescension.

If Mr. Sayers would read the account of these matters which have so greatly roused his scorn in the book by Gabriel Ramon, the official historian of the Bank of France, he would probably realise he had been tilting at windmills.

R. J. TRUPTIL

Economic Planning in Australia, 1929-1936. By W. R. MACLAURIN
P. S. King & Son. 1937. 304 pp. 15s.

The march of time has enabled Dr. MacLaurin, an American economist, to re-examine Australian depression policy from a point of view somewhat more detached than was possible for his two Australian predecessors who have already worked over that episode

of economic history.¹ An American economist, he spent a considerable time in Australia in 1934-5, and many Australian economists will have a vivid recollection of his pertinacious and penetrating questionings. Unlike Pilate, he always waited for an answer. He gives more space to post-depression policy than to the sharp controversies which raged while the depression was at its height, and his survey of public works policy, of government assistance to agricultural industries, of debt relief legislation and of Commonwealth Bank Policy and the development of Treasury Bills, brings the story down to 1936.

The general outline of Australian depression policy is now fairly well-known. Aiming, as Professor Copland has put it, at "a well-considered mingling of deflation and inflation," it endeavoured to combine exchange depreciation, wage-cuts, reduction of government expenditure, lowering of interest charges and an expansionist internal monetary policy. The first two items in the list had already more or less imposed themselves before there was much serious talk of a "plan," but though as Dr. Maclaurin points out, "the prestige of the Premier's Plan has since grown steadily until, in the eyes of many, it has taken on a much more comprehensive form than it naturally had," it is not now very important to debate further how far the policy which was adopted conformed to any rational interpretation of the word "plan." It is more important to ask first whether the policy was immediately successful and second, whether it laid the foundations of an economic structure which would in the future be less susceptible to such shocks as afflicted Australia in 1929-30. "As a practical measure," Dr. Maclaurin tells us, "the Plan was an enormous success," but his discussion of the more fundamental aspects of reconstruction policy rightly strikes a more cautious note. Depression policy was inevitably concerned almost exclusively with short-period considerations, but when one reads that though "by the end of 1931 the main depression adjustments had been made . . . three years later, one worker out of five was unemployed and investment had still not revived," one doubts whether preoccupation with such considerations may not have distracted public attention unduly from the much more important task of making long-period adjustments, some of which might necessitate a radical revision of some traditional policies.

The word "planning" was very popular in Australia during the depression period, but it imposes a certain strain upon the English language to use the phrase, for purposes either of approval or of condemnation, as descriptive of policy throughout the period with which Dr. Maclaurin deals. As he says, "the Administration from 1932 to 1936 followed a policy primarily of waiting for something to turn up," a policy which was not inconsistent with encouragement of "the continued flow of capital into uneconomic production,"

¹ E. R. Walker, *Australia in the World Depression* (1933) and D. B. Copland, *Australia in the World Crisis, 1929-33* (1934).

and with "too much emphasis on displacing competitors and little or no attempt to stimulate new trade." It is to be hoped indeed that Australian readers will not take too seriously Dr. Maclaurin's belief that "Australia has preserved the essence of capitalism."

Dr. Maclaurin's comments often have the freshness which one might expect from an investigator who has had close contacts with many of those who played an important part in determining Australian policy. Nevertheless, as is no doubt becoming in a "foreigner," he adopts a sober style which is unlikely to irritate sensitive Australians. The future historian will perhaps be able to import into his work a more ironical note. Australians frequently exhibit in an exaggerated degree the pleasing English trait of refusing to admit that they can ever be guilty of "unorthodoxy." Whatever policy they adopt immediately by that very fact becomes respectable and "sound." This trait is an easy mark for the satirist, but for the most part Dr. Maclaurin leaves the readers of his account of Australia's novel depression expedients to make their own comments when they hear political leaders to-day claiming credit for saving the country by the methods of "sound" finance. The future historian will also perhaps have more to say about a Labour party which on occasion talks a good deal about socialisation but steadily refuses to think seriously about the problems which any effective attempt to socialise inevitably raises.

ALLAN G. B. FISHER.

Les Variations du Mouvement Saisonnier dans l'Industrie de la Construction: étude méthodologique et analyse des faits. By HORST MENDERSHAUSEN. Georg et Cie, Geneva. 1937. 209 pp. Price not given.

This very thorough study provides a survey of the literature of seasonal variations, and works out an example of the method of direct analysis.

The first chapter, which corresponds with Dr. Mendershausen's article in *Econometrica* of July, 1937, examines critically the principal methods devised for isolating the seasonal element in time-series; the survey is comprehensive, and a valuable bibliography is appended. The criticisms are clearly expressed, and formally at least they are just, but I feel that the author goes too far when he concludes that methods such as those of Kuznets, Gräbner and Wald, which yield an adjusted and changing seasonal element, do not constitute an important advance. He objects that these mechanical procedures are strictly appropriate only in conditions which can seldom be fulfilled in practice, and he contrasts them with the analysis in which the seasonal element is traced back to the factors, such as temperature, which determine its size. The cases, however, in which such irregularly

operating factors impinge with substantial effect upon the seasonal pattern and can themselves be statistically expressed, must be relatively few. In the remainder, methods such as those of Kuznets and Wald may be retained as a working compromise between the two unacceptable extremes of using an unchanging seasonal correction and treating as the seasonal element in each month the whole difference between the original record and the moving average.

The second and longer chapter sets out an example of the analysis which Dr. Mendershausen advocates. He studies the seasonal fluctuations of employment in the building trade of five countries—Belgium, Denmark, Germany, Great Britain and Holland—and using the multiple correlation methods of Ezekiel, he traces the dependence of the seasonal element on (principally) temperature and the cyclical level of activity. Especial interest attaches to his finding that though in general the amplitude of seasonal changes increases with a fall in the cyclical level from its highest, there is evidence that after a point the regression changes sign, and a further fall in the cyclical level is associated with a diminution of seasonal amplitude. The exposition is systematic, the analysis ingenious and pertinacious.

E. H. PHELPS BROWN.

Saving and Investment. By W. E. ARMSTRONG. Routledge. 1936.
x + 270 pp. 12s. 6d.

Mr. Armstrong explains in his preface that the purpose of his book is to construct a theory of capital in a developing community from the simple principle that "human beings tend to equate the marginal disutility of their labour with the marginal utility of the product, whether this product is in the present or the future and whether this future is psychologically discounted or not" (Preface, p. ix). Actually only the first four chapters deal with the pure theory of capital, the rest are taken up with attempts to apply the theory to the real world and to monetary and trade cycle problems.

Unfortunately Mr. Armstrong adds to the difficulty of a difficult subject by taking up, in Chapter II, what amounts to the extreme Böhm-Bawerkian position of regarding time-preference and productivity as mutually independent and sufficient reasons for the existence of interest. He concludes from this that it is unnecessary to discuss time-preference except under special circumstances irrelevant to the main body of capital theory, and concentrates on a purely productivity theory related primarily to net saving. As a result a dichotomy between the maintenance and accumulation of capital is introduced from the beginning which prevents Mr. Armstrong achieving a unified theory of capital.

Despite this, the third and fourth chapters on "Simple Capital" and "Working Capital and Fixed Capital," respectively, contain

valuable attempts to clarify the underlying concepts of capital theory. In the main Mr. Armstrong follows the Austrian school but he demonstrates conclusively that the concept of the "period of production" can be given precision only under highly artificial assumptions and in physical terms. Equally important, his analysis re-emphasises the fact that some discussion of capital theory in this way is an essential preliminary to the understanding of the nature of capital. It is the more unfortunate that Mr. Armstrong's preoccupation with this aspect prevents him from appreciating that the treatment of capital in value terms is equally important. As a result he misses the opportunity of examining the possibility of reconciling the Austrian theory of capital with more recent theories of the effect of expectations on the maintenance and accumulation of capital.

It is not possible to discuss the numerous controversial points raised by Mr. Armstrong in his chapters on neutral money and the trade cycle. It must suffice to say that he succeeds in clarifying the different uses of many terms used in current controversy. It is indeed in the painstaking search throughout the book for precise definitions of many vague concepts that Mr. Armstrong's main contribution lies.

MARIAN BOWLEY.

The Ethics of Competition and Other Essays. By FRANK HYNEMAN KNIGHT. George Allen and Unwin. 1935. 363 pp. 12s. 6d.

The visit of Professor Frank Knight to lecture in England may not inappropriately be made the occasion for acknowledging in this journal our sense of the debt which economists owe to the four Editors who are responsible for this collection of eleven of his articles. They are prefaced by an invaluable bibliography of Professor Knight's writings published during the period 1915-1935.

In recent years the name of Frank Knight has had special associations for the select few who are most interested in the higher criticism of capital and monetary theory. From this field the Editors have selected only the article on Interest from *The Encyclopædia of the Social Sciences*, "because this is a subject about which Professor Knight has radically altered his views, furthermore, he is at present writing a book on this topic". The eager anticipation with which that news was everywhere received is evidence of the esteem in which his writings are held. His influence upon thought in post-war years has been remarkable. For the younger generation of economists *Risk, Uncertainty and Profit* represents their first serious introduction to the main body of economic doctrine. They recollect that it was Frank Knight who on the other side of the Atlantic first called attention to the brilliance of that neglected sun Wicksteed shining in our own firmament and who, at a later date, when our aroused respect showed signs of degenerating into hero-worship, took pains to discover the

spots upon the sun. The Knightian School is none of Knight's making.

Ten of these collected essays were already known and more or less available. The eleventh, not previously published, is a contribution of surely permanent value. *Economic Theory and Nationalism* reads as though inspired by a prophetic insight into the unhappy events of 1938. It is concerned with the responsibilities of economists and students of society in a world in which Leaders flourish because they are not leaders, and in which charlatan "scientists" endeavour to import into the field of social investigation, by "vicious analogy from natural science," techniques of study which are meaningless in the social context. "The beginning of talking sense about social phenomena from the standpoint of relevance to the intellectual direction of social process by a society and in its own interest, is the recognition that the general concepts of such a discussion are *not* those of natural science" (p. 339).

Three years ago, Professor Knight still retained sufficient optimism to believe that reform of their own conduct might suffice to ensure for students of social phenomena the preservation of their liberty and the opportunity to influence social behaviour. "It seems reasonable to believe that if it were possible to maintain professional groups in the fields of special knowledge and research covered by the social sciences, including ethics, and religion as a social phenomenon, and if the workers took a "consecrated" attitude toward their common work, "devoting" themselves to a truly co-operative quest of the right or "best" solutions for problems, absolutely renouncing interest in individual prominence and power, and going to the public only with dispassionate statements of fairly established results, the politicians might find it good politics both to allow them to live and to take their work seriously" (p. 358). This, the latest essay in the volume, makes no more easy reading than its predecessors, and indeed contains matter enough for a large volume in itself, but like all that he writes it will not for that reason lack readers, and Professor Knight must accept the blame if many of them ignore part of his injunction and acclaim him as their Fuehrer. The argument is too compelling.

ARNOLD PLANT.

The Economic Library of Jacob H. Hollander, Ph.D. Compiled by
ELSIE A. G. MARSH. Privately printed. Baltimore. 1937.
xiii + 324 pp.

This exquisitely-produced catalogue of, at a rough estimate, about four thousand works on economics, of which the vast majority were printed before 1900 and perhaps two-thirds before Ricardo, will arouse feelings of gratitude in the hearts of all its recipients for, apart from its personal association, it provides a convenient bibliography which includes most rare items and many treasures. The present reviewer must confess also to a renewed pang of envy of those whose

good fortune it was to begin their collections in the nineteenth century. In a felicitous foreword, Professor Hollander tells us that it was the sight of Foxwell's library at St. John's, Cambridge, when in 1895 he paid his first visit to this country, that gave the first impulse to make his own collection. To-day there can surely be few to equal it in its comprehensiveness or, judging by the modest indications in the foreword, in its elegance.

Every classification of a library is a choice between evils, and the system adopted in the present case, involving a compromise between chronology and authorship, will probably afford general satisfaction. Professor Hollander so frequently possesses the earliest known publication of each of the principal economists that the reader who remembers to look under the year 1759 will feel gratified to find the *Wealth of Nations* there, and if he forgets the year of publication of *The Theory of Moral Sentiments* he can always find Adam Smith in the index at the end. It was, however, a little disconcerting not to find *Malthus and His Work* among the main list of works by Dr. James Bonar, including his studies of John Stuart Mill, under the year 1893, but it was soon located, following the works of Malthus, in the section headed 1798.

Professor Hollander has won a high place among those "who have cared for books not only as tools of their trade, but as living things to be assembled for their distinction, to be admired for their elegance, to be cherished for their association." The world's stock of the books which make up the heritage of our science is all too slender; the issue of this catalogue may perhaps stimulate more of us to watch vigilantly for what remains and to preserve it from destruction.

ARNOLD PLANT.

Recent Important Foreign Books on Economics

The Librarian of the British Library of Political and Economic Science has made arrangements, as a supplementary check to the purchases of the Library, to receive regularly every quarter from competent foreign scholars lists of the most important books in their respective fields of study published in their own countries (or languages as the case may be) during the preceding three months. It appeared to the Editorial Board of *ECONOMICA* that these lists might prove useful to other institutions, and the lists of books on economics will therefore be published regularly in future issues of *ECONOMICA*. It must be understood, however, that the Editorial Board of *ECONOMICA* accepts no responsibility for the selection of the books included in the list.

AMERICAN BOOKS

(Selected by Professor H. D. Gideonse)

- COLE, ARTHUR H.: *Wholesale Commodity Prices in the United States; with statistical supplement: Actual Wholesale Prices of Various Commodities*. Cambridge, Mass. xxiii, 187 + 359 pp.
- COLM, GERHARD, and LEHMANN, FRITZ: *Economic Consequences of Recent American Tax Policy*. New York. xii, 108 pp.

FRENCH BOOKS

(Selected by Professor Charles Rist)

- BAUDIN, LOUIS: *La Monnaie*. Paris. 218 pp.
- LAUFENBURGER, HENRY: *Le Commerce et l'Organisation des Marchés*. Paris. xii, 658 pp.
- LHOMME, JEAN: *Le Problème des Classes: Doctrines et Faits*. Paris. 354 pp.
- PIROU, GAËTAN: *Essai sur le Corporatisme*. Paris. 172 pp.
- PIROU, GAËTAN: *Les Nouveaux Courants de la Théorie Economique aux États-Unis*. Fasc. 3. *De l'Économie Statique à l'Économie Dynamique*. Paris. 278 pp.

GERMAN BOOKS

- ÅKERMAN, JOHAN: *Das Problem der sozialökonomischen Synthese* (Skrifter utgivna av Vetenskaps-Societeten i Lund), Lund. 329 pp.
- AMONN, ALFRED: *Volkswirtschaftliche Grundprobleme*. Einführung in das volkswirtschaftliche Denken. Jena. viii, 167 pp.

POSSONY, STEFAN TH.: *Die Wehrwirtschaft des totalen Krieges*. Vienna. 155 pp.

WEBER, ADOLF: *Depositenbanken und Spekulationsbanken*. 4. völlig neubearbeitete Auflage. Munich. xviii, 402 pp.

ITALIAN BOOKS

(Selected by Professor Luigi Einaudi)

AMOROSO, LUIGI: *Principii di Economia Corporativa*. Bologna. xix, 367 pp.

EINAUDI, LUIGI: *Miti e Paradossi della Giustizia Tributaria*. Turin. 278 pp.

LUZZATO, GINO: *Storia Economica dell'Età Moderna e Contemporanea*. Parte I. L'Età Moderna. 2nd ed. Padua. iv, 357 pp.

VINCI, FELICE: *Manuale di Statistica: Introduzione allo Studio Quantitativo dei Fatti Sociali*. Vol. 2. 2nd ed. Bologna.

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- ALLEN, A. M., and others : *Commercial Banking Legislation and Control*. Macmillan and Co., Ltd. 1938. xi, 513 pp. 18s.
- ALLEN, F. : *Can Capitalism Last?* Victor Gollancz, Ltd. 1938. 286 pp. 7s. 6d.
- ALLEN, R. G. D. : *Mathematical Analysis for Economists ; Studies in Statistics and Scientific Method*. Macmillan and Co., Ltd. 1938. xv, 548 pp. 31s. 6d.
- AMOROSO, L. : *Principii di Economica Corporativa*. Nicola Zanichelli Editore, Bologna. 1938. xix, 367 pp. L.30.
- ANDERSON, PROF. OSKAR N. : *Struktur und Konjunktur der bulgarischen Volkswirtschaft*. Verlag von Gustav Fischer, Jena. 1938. 18 pp. No price stated.
- BAILEY, S. H. : *International Studies in Modern Education*. Oxford University Press. 1938. xvii, 309 pp. 15s.
- Board of Trade. *Statistical Abstract for the United Kingdom*, for each of the fifteen years 1913 and 1923 to 1936. H.M.S.O. 1938. xvii, 453 pp. 7s.
- COLE, G. D. H. : *Economic Prospects ; 1938 and after*. Fact No. 11. 1938. 98 pp. 6d.
- COLM, G., and LEHMANN, F. : *Economic Consequences of Recent American Tax Policy*. New School for Social Research, New York. 1938. ix, 108 pp. \$1.00.
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- COULBORN, W. A. L. : *An Introduction to Money*. Longmans, Green & Co., Ltd. 1938. xvi, 277 pp. 6s.
- CROOME, H. M., and HAMMOND, R. J. : *The Economy of Britain*. Christophers. 1938. xx, 327 pp. 8s. 6d.
- DAVISON, RONALD C. : *British Unemployment Policy ; the Modern Phase since 1930*. Longmans, Green & Co., Ltd. 1938. x, 136 pp. 7s. 6d.
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- DIGBY, MARGARET: *Producers and Consumers; A Study in Co-operative Relations*. P. S. King & Son, Ltd. 1938. 254 pp. 8s. 6d.
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- Eightieth Report of the Commissioners of His Majesty's Inland Revenue*. H.M.S.O. 1938. 72 pp. 1s. 3d.
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- HUPPERT, W.: *Grundlagen des Geldes*. Duncker & Humblot, Munich. 1938. 57 pp. Rm. 2.
- ISSERLIS, L.: *Tramp Shipping, Cargoes and Freights*. Royal Statistical Society. 1938. 53-146 pp. Vol. CI. Pt. I. 2s. 6d.
- KRANOLD, H.: *The International Distribution of Raw Materials*. George Routledge & Sons, Ltd. 1938. xxiv, 269 pp. 15s.
- KUZNETS, S.: *National Income and Capital Formation, 1919-1935*. National Bureau of Economic Research, New York. Macmillan & Co., Ltd. 1938. x, 86 pp. No price stated.
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- PEDERSEN, J., and PETERSEN, O. S.: *An Analysis of Price Behaviour*. Institute of Economics and History, Copenhagen. Oxford University Press. 1938. 268 pp. 12s. 6d.
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- PRIBRAM, A. F.: *Materialien zur Geschichte der Preise und Löhne in Österreich*. Carl Ueberreuters Verlag, Vienna. 1938. xxxviii, 879 pp. No price stated.
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- Report made to the Pilgrim Trust: Men Without Work*. Cambridge University Press. 1938. xii, 447 pp. 7s. 6d.
- Report of the Textile Labour Inquiry Committee 1937-38*. The Government Central Press, Bombay. 1938. ii, 104 pp. 6d.
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Assets, Prices and Monetary Theory

By H. MAKOWER and J. MARSCHAK

Contents. 1. INTRODUCTION. CERTAINTY: 2. ASSETS AND YIELDS. 3. TASTES. 4. TRANSFORMATION CONDITIONS. 5. INDIVIDUAL'S EQUILIBRIUM. 6. MARKET IN EQUILIBRIUM. 7. INTEREST RATE, DETERMINACY AND EQUILIBRIUM. II. UNCERTAINTY: 8. DEFINITIONS. 9. TASTES IN AN UNCERTAIN WORLD. 10. MARGINAL LUCRATIVITY AND SAFETY. 11. CLASSIFICATION OF ASSETS. 12. FUTURE SALEABILITY. 13. FUTURE PLASTICITY. 14. TYPES OF ASSET: SUMMARY. III. MONEY AND OTHER ASSETS: 15. CASH HOLDINGS. 16. "THE VELOCITY OF CIRCULATION." "THE LIQUIDITY POSITION." 17. THE RATIONALE OF "THE INTEREST RATE" AND "THE PRICE LEVEL." 18. CHANGING DATA.

I. INTRODUCTION¹

IN order to understand what determines people's cash holdings and the prices of goods in terms of cash, we have to discuss more generally the causes making people hold idle stocks—of which cash balances are a particular case. This necessitates the application of Equilibrium Theory generalised to take account of time, imperfect competition and uncertainty. Our procedure is as follows.

§§ 2-7 give the theory of prices and quantities of assets generalised to take account of time. The case of joint demand together with joint supply² is presented: a number of consumption goods or *yields* are produced by the combination of a number of production goods, or *assets*. This takes us rather far back into the theory of marginal productivity and utility: we have to give a broader version of that theory, since the usual versions treat of joint demand without joint supply or *vice versa*.³ It has seemed worth

¹ This article reconsiders certain ideas which were treated by one of the present authors in a memorandum on Investment circulated privately in 1935 and in a paper read at the 1935 Meeting of the Econometric Society. A mathematical version of the article is to appear shortly in *Econometrica*; see also the Report of the Colorado Springs Conference for Research in Economics, 1937. The subject was also treated by the writers in an unpublished thesis called *The Theory of Value on the Capital Market*. It will be noticed that in the present discussion of Value and the Capital Market, neither the word Capital nor the word Value appears. It was found better to base the discussion on prices and assets, which are measurable quantities.

² In Marshall's sense. *Principles*, Bk. V., Ch. VI.

³ Loans repayable in a lump sum and stocks of consumers' goods represent as nearly as possible cases where there is no element of joint supply or joint demand. The theory of prices and quantities in an economy where one asset always produces one yield is given by Irving Fisher (*Theory of Interest*). For most items in a balance sheet, however, this simplification breaks down. Even the marginal productivity theory of prices of factors of production is a special case, because it assumes only one yield jointly produced by many factors.

while to do this spade-work deep down in the foundations of equilibrium theory; for it enables us to build the theory of asset prices upon something less uncanny than a sheep producing quite on its own supplies of meat and wool ready for consumption; or a combination of assets producing an output (with no by-products) at one blow, and then collapsing instantly on to the scrap-heap.

The generalisation of the theory from one which is applicable to a riskless economy only, to one which applies also to a hazardous world, is given in §§ 8–10. §§ 11–14 order assets according to some fundamental characteristics, such as safety and future saleability, etc. In §§ 15–18 the theory is applied to cash holdings, and a link is forged between the Quantity Theory of Money, the Theory of Interest, and the Theory of Asset Prices.

We may distinguish the following types of *data* for each individual:

- Tastes;
- Initial resources;
- Transformation conditions;
- Market conditions.

It will be shown that these data determine the following *unknown quantities* (also called equilibrium¹ quantities):

- Prices of assets;
- Quantities of assets exchanged and possessed by each individual in equilibrium;
- Quantities of yields consumed in the future.

I. CERTAINTY

2. ASSETS AND YIELDS.

Yields are *flows* while assets are *stocks*. Yields are consumed but not exchanged; assets are exchanged but not consumed.² Yields may differ not only in quality but also in the time at which they accrue.

Assets are physical goods or claims which give rise to yields. Debts are negative assets. There are only present

¹ See, however, below § 7.

² Instead of contrasting production goods and consumption goods we shall for the purpose of our analysis contrast assets and yields, the former being stocks, the latter consumed flows. The treatment of what might appear to be cross cases presents no serious difficulty: the service "dwelling accommodation" is a consumption flow, or yield. On the other hand labour is regarded as the stock of services of the labourer over the period for which the worker is signed on, that is as an asset.

assets, not future assets. Dealings in futures can be treated as dealings in present claims. Futures are present claims on future yields. We shall call a collection of assets a *property*, or balance sheet. The problem is, what property will each individual possess after having exchanged on the market, given the initial property with which he comes to the market, and given also his tastes and the transformation and market conditions.

It must be borne in mind that yields are here defined as amounts consumed. In the particular case where there is only one quality of yield, or else a bundle of fixed composition, we might define "investment" during a year as the discounted value of the yield series expected from a property as it is at the year's beginning *minus* the discounted value of the yield series expected from the property as it is at the year's end (the term discounted will be defined below, § 3). Investment thus defined may be negative; it is then usually called disinvestment or wear and tear. "Net yield," or income, would then be the sum of consumption and investment (or consumption *minus* wear and tear), and therefore consumption, or gross yield, is net yield *minus* investment (or *plus* wear and tear). In reality, however, there are many qualities of yield. Consequently it is not in general possible to define either investment or net yield without recourse to some artificial index numbers which break down whenever relative quantities change considerably. However, it is not necessary for us to use these concepts here: the quantities fundamental for our discussion are the various yields—by which we always mean *gross* yields—and the various assets.

Thus in the case of a loan the lender's yield in a given year is his consumption of the amount repaid to him, irrespective of how much represents "interest" (or net yield) and how much "amortisation" (or disinvestment). Or, if the share is sold, the yield is the ultimate consumption of the proceeds from the sale. Hence yields depend not only on physical transformation but also on future exchange. The appreciation of an asset which is to be sold must affect the yield in some year or years.

3. TASTES.

Individuals' tastes refer to consumption. They are expressed by indicating the order of preference for all

conceivable combinations of yields. Each individual tries to maximise the satisfaction he gets from the consumption of all the yields derived from all his assets. His satisfaction, or "utility", depends upon the size, physical quality and time distribution of his yields.

For each individual enjoying given quantities of yields there are definite rates at which he would be willing to substitute a small amount of any one yield (say milk in the first year) for any other yield (milk in the second or third year, or meat in the first, second or third year, etc.). These *rates of preference* are ratios between marginal utilities. They vary with the quantities of yields enjoyed (so-called "law of decreasing marginal utility"). The rates of preference enable us to express any bundle of yields—certain amounts of milk and meat in the first and second year—in terms of an equivalent amount of a single yield, say milk in the first year. If two yields differ not in quality but in time only, the rates of preference are called *time preference rates* (impatient people have high time preference rates). The translation of any future yield into an equivalent amount of present yield will be called *discounting*. It will be convenient to use this term in a wide sense, to describe the translation of any kind of yield at any time into some kind of present yield, by means of the time and quality preference rates. The yield selected as *standard yield* (e.g., present consumption of 1lb. of bread) is, of course, arbitrary. By discounting a bundle of future yields we obtain the present value of the bundle.

People do not exchange yields, they exchange assets. Prices are exchange ratios between assets. Yet people have no direct preferences for assets, but only for things consumed. The link between yields and assets is provided by the *Transformation Conditions*.

4. TRANSFORMATION CONDITIONS.

By a *bundle of yields* we mean a series of yields of various qualities in different points of time. Transformation conditions tell us all the possible bundles of yields which can be got in the future from any given property, either by physical transformation or by exchange.

In general there is no meaning in the phrase "productivity of an asset" independently of other assets. The increase of yields due to the addition of an asset depends upon the

other assets with which it is combined. If a coal-washing plant is brought into a sugar factory it will make less difference to the yield than if the same plant is installed in connection with a coal mine.

The ratio at which it would be possible to substitute one asset for another while keeping yields unaltered, we shall call the *rate of transformation of assets*. This rate usually changes with the quantity of the asset that is substituted (the so-called "law of varying returns"). The larger the decrease in the rate of transformation accompanying a given change in the quantity transformed, the less transformable is the one asset into the other. (In the limiting case where the rate is constant, there would be perfect transformability.)

Similarly, the rate at which it would be possible to substitute one yield for another, without altering the assets, we shall call the *rate of transformation of yields*.

The transformation conditions are subjective in the sense that they are people's estimates. They need not be correct nor need they be the same for different individuals. Yet their being subjective does not mean that we are already concerned with an uncertain economy. Until § 8 we shall assume that every individual thinks he knows exactly the yields accruing from given properties.

5. THE INDIVIDUAL'S EQUILIBRIUM.

(a) CRUSOE.

Since an isolated individual cannot exchange, he cannot alter his initial property, which is therefore identical with his equilibrium property. But he can choose between various bundles of yields which can be produced from his property. His satisfaction will only be at a maximum when his preference rate for yields is equal to the transformation rate for yields. Thus the condition of equilibrium is that the rate at which he is *willing* to substitute yields must be equal to the rate at which he is *able* to substitute them.

(b) A PRODUCER IN A PERFECT MARKET.

The individual in a perfect market regards prices as given to him and as uninfluenced by the quantities he sells. In equilibrium he will choose such a combination of assets,

and with this combination he will produce such a bundle of yields, as will make (i) his rate of preference equal to the transformation rate for yields, (ii) the rate of transformation of assets equal to the ratio of market prices. The first condition also applies to Crusoe, but the second does not.

The equilibrium requirement can be put in the familiar way, in terms of marginal productivity, provided only that we define marginal productivity more generally than is done in the usual marginal productivity theory, where it is assumed that there is only one product. As has been seen, an asset may contribute a variety of alternative bundles of yields. The marginal productivity of an asset is the most preferred bundle of yields (properly discounted by using preference rates and thus expressed in terms of standard yield) of all those bundles which may result from the addition of one unit of an asset to the existing property. When we say that in equilibrium the price of each asset is proportionate to its marginal productivity, we mean that it is proportionate to the utility of its most preferred bundle of yields.

One asset—say £1 cash—may be chosen as a numéraire, i.e., its price taken as unity. The numéraire must not be confused with the standard yield—say present consumption of 1 lb. of bread—which is the yield (not an asset!) the marginal utility of which is taken as unity.

Since the future yields contributed at the margin by an asset depend not only on production, but also on the proceeds of future sales, the term marginal productivity is employed in a more general sense than usual.

(c) A PRODUCER IN AN IMPERFECT MARKET.

In the present passage and in § 6 (b) we give the analysis of equilibrium in an imperfect market.¹ This makes the theory more realistic. But it is not essential to the main argument and may be omitted by the reader. Only the concept of market imperfection is required for the later discussion, when we deal with future saleability as a property of cash.

We can generalise the analysis of the individual's equilibrium in a perfect market so as to cover also imperfect

¹ Pietri-Tonelli (*La Spéculation de Bourse*) also treats imperfect competition in the capital market. Our method seems, however, to be more in tune with the General Equilibrium approach.

markets, by introducing the concept of *market conditions*. Market conditions describe the way in which price varies as the individual increases the quantity he sells. The "initial price" is the price obtained if he sells a very small quantity. The ratio between total quantities exchanged is the *average price*. The *marginal price* is the exchange ratio between small quantities in the neighbourhood of the equilibrium point. Prices actually charged on the market are in general average, not marginal, prices. Only in a perfect market is the average price equal to the initial (and also to the marginal) price. Thus the case where the market is perfect represents one special market condition. The individual in an imperfect market regards the way in which prices vary with quantity sold, as given to him. Once the initial price is given, his equilibrium is fixed by his initial resources, his tastes, and his transformation conditions. He will sell that quantity which makes the ratio of the marginal prices equal to the ratio of the marginal transformation rates.¹

6. THE MARKET IN EQUILIBRIUM.

(a) A PERFECT MARKET.

When in the preceding section we assumed perfect markets, that is, dealt with an individual who regarded prices as uninfluenced by his own sales, we took the prices as given. Maintaining, to begin with, the restricting assumption of a perfect market, we shall now see how prices themselves are determined by the tastes, transformation conditions

¹ Geometrically, the relationship between the price of an asset and the quantity sold by an individual can be represented in the Marshallian way, as a Demand curve drawn in a system of co-ordinates measuring horizontally the quantity of an asset sold and vertically its price in terms of another asset. The initial price is given by the intercept of the curve on the vertical axis. When market conditions are given, the initial price fixes the whole curve.

The alternative way of representing graphically the relationship between prices and quantities sold is Pareto's (and Fisher's) way. Here each co-ordinate measures the quantity of one asset retained after exchange. The line connecting the point representing the initial quantities with other points accessible by exchange is called the market line (or surface) and the marginal price at any point is given by the slope of the line. The initial price is the slope at the point representing the initial quantities. If market conditions are given, the initial price fixes the whole *allure* of the market line.

In a Marshallian figure a perfect market is shown by a horizontal straight line, an imperfect market by a falling curve. In the Paretian system a perfect market is shown by a straight line (always falling), an imperfect one by a curve (always falling and concave downwards). The degree of perfection of the market can be roughly measured by the elasticity of the demand curve confronting an individual or firm, or by the curvature of the market line. Strictly, this concept of measurable perfection of the market only applies if the elasticity is constant all along the line.

and initial resources of every individual. For each conceivable exchange ratio between a pair of assets (goods or claims), there are definite quantities of each asset which each individual would be willing to buy or sell. Only that exchange ratio can obtain in the market for which the double condition is satisfied: that, for each asset, the total quantity people are willing to buy equals the total quantity other people are willing to sell (clearing of the market); and that each person's receipts, expressed in terms of any one asset, equal his expenditure.

(b) AN IMPERFECT MARKET¹.

This statement of the way in which prices are determined can be generalised, so as to make it applicable also to the case where the market conditions of each individual are not perfect, but instead some other market conditions are given, in general different for each person. For each conceivable initial price, there are definite quantities which each individual would be willing to exchange—namely those which equalise the ratio of marginal prices to the ratio of transformation rates. These quantities imply also definite average prices. As in the case of the perfect market, the quantities and prices which each individual spends must be compatible with the quantities and prices selected by all other individuals. This gives the same double condition as before: total quantities bought and sold must be equal for each asset; expenditure must equal receipts for each individual.²

Suppose we add to our property an asset, some quantity of which is going to be sold at some definite time in the future. If the market is imperfect (few buyers) the future selling price and therefore the discounted yield from the present property is lower than if the market were perfect.

¹ As mentioned above, this passage may be omitted by the more impatient reader.

² We may now give the geometrical interpretation of the way in which prices themselves, as well as quantities of assets, are determined. Each market line (or demand curve) corresponds to the series of marginal prices, starting with the initial price, which may confront the individual as he proceeds to exchange increasing quantities. Only one line, for each individual, is eligible when initial resources, transformation conditions and tastes are given. Which line is thus eligible is determined by the double condition given in the text. Thus market conditions are a whole bundle or family of curves, going through the initial point, and having some given property. In the special case of perfect competition they degenerate into a bundle of straight market lines (or a set of horizontal linear demand curves). Constant (finite) elasticity is an example of an imperfect market condition. But a market condition is a more general property than elasticity. Any other property common to a family of curves can give a market condition.

We may compare the asset's discounted marginal contribution to the yield of the property with what this marginal contribution would be if the market for the asset were perfect. This difference between the two can be reduced, i.e., the market can be made more perfect, by advertising (in the wide sense of the word including, e.g., brokerage). Advertising will be pushed to the point where its cost equals the gain from perfecting the market.

In general the extent to which the imperfection of the market is reduced by advertisement depends on how long the seller waits between advertising and selling. By waiting longer he gets in touch with more buyers. But on the other hand the yields will have to be discounted more heavily for time (see § 3). He will select that waiting interval which maximises the sum of his discounted yields.¹

7. INTEREST RATE, DETERMINACY AND EQUILIBRIUM.

We have shown how the quantities of assets exchanged and possessed, together with their prices, are determined. It may be asked why no mention has been made of the rate of interest. As yields are not in general exchanged in the market, no "price of present yield in terms of future yield" can be found in the market. Individuals' subjective time preference rates refer to yields; they are not equalised in the market.

Instead of saying that a one-year loan of £100 with guaranteed interest of £7 p.a. costs to-day £104, we may, if we like, say that the rate of interest is 3 per cent. This is an application of the formula (§ 5 (b)): price is proportionate to the discounted value of the marginal gross yield.² Only

¹ An interesting unpublished paper on this subject by Mr. Hasler was mimeographed for the London, Cambridge and Oxford Joint Seminar. Mr. Hasler depicts the equilibrium time for the seller to wait in a diagram, where the axes measure time and price. Equilibrium is shown as the point of tangency between an indifference line (for present and future yields) and the schedule connecting time and price.

The schedule of the prices that can be fetched after various waiting intervals depicts the ease with which an asset can be sold. But it does not help to explain the size of cash-holdings. We shall therefore not apply the term saleability to it. Saleability, in the sense in which this term will be used here to explain cash-holdings and other idle stocks, is a property which, although connected with market conditions, only arises in an uncertain world.

² The present price of 100 units of the loan is: $£104 = 0 + \frac{107}{(1.03)^1}$

The present price of 100 units of cash is: $£100 = 100 + \frac{0}{(1.03)^1}$

Therefore the price ratio is $\frac{104}{100}$.

it should be remembered that this "rate of interest" refers simply to the price of one asset (cash) in terms of another (one-year loan). If the loan runs for more than a year we can still define the rate of interest as that percentage which, given the yields, would, if used to discount yields in all years, give the actual price of the loan in terms of cash. It is in this sense that "the market rate of interest" is sometimes calculated from the yield and the price of consols. Clearly this calculated interest rate is quite distinct from individuals' preference rates. It is a function (a kind of mean) of the various preference rates for different years, for each individual. Obviously this mean may be the same for all individuals although no two individuals have the same time-preference rate for any given pair of years.

The data of our analysis—tastes, transformation conditions, initial resources and market conditions—are subjective, in the sense that they are estimates made by individuals. On the other hand the prices of assets and the quantities exchanged, which are unknowns of our system, are objective. At any given moment there are definite prices and quantities of assets which are consistent with the set of data. We sometimes call these the equilibrium prices and quantities. But it must be understood that by equilibrium we merely mean determinacy. There is absolutely no guarantee that the prices and quantities will persist through time. Suppose even that the data do not change, i.e., that people do not revise their estimates. Then, in the first place, the quantities and prices as determined in the first moment of time will in general not persist in the later moments, because people's plans for the future will usually incorporate quantities which vary through time. In the second place, even if we could assume that people plan for unvarying quantities, the fact that the plans of the various individuals need not be compatible will mean that quantities which had been planned in the past are not maintained; for the market for assets must always be cleared. Finally, the data usually do change: people continually revise their estimates in the light of experience. Thus prices and quantities tend to change continually, although they are determinate at each moment.

To talk of a "natural rate of interest" is an over-simplification. But we could define a natural system of prices in a way which might correspond to the situation that

economists have in mind when they talk of the natural rate of interest. A natural system of asset prices would be a system which can remain stable through time. We have just shown that the data at any given time, though fixing equilibrium in the sense of a determinate system of prices, do not by any means imply a stable system either of prices or of quantities. The question of conditions of stability is essentially dynamic and requires a study of the causes determining the data themselves.

II. UNCERTAINTY

8. DEFINITIONS.

We have assumed so far that there is certainty. We have now to enquire what are the data in an uncertain world.¹

People do not know, they can only guess at, the yields they will be able to get from their properties, whether by productive activity or by future exchange. The yields must be expressed as an array of more or less probable quantities, that is as a frequency distribution,² or more strictly a system of yields must be expressed by a joint frequency distribution.

At least two characteristics are usually used to describe approximately a frequency distribution: some measure of average and some measure of variability or dispersion. Measures of average are, for instance, the most probable

¹ We appreciate the importance of Professor Knight's distinction between risk and uncertainty. It seems that we may interpret Professor Knight's "risk" as the dispersion of the frequency distribution of alternative future events, and his "uncertainty" as the degree of ignorance about this frequency distribution. For the first concept we too shall use the term *risk*; as to the second, we find it more convenient to call it *degree of ignorance*.

This enables us to reserve the term *uncertainty* to denote the fact that risk exists, i.e., that no event is assigned the probability 1 (and therefore the dispersion is greater than zero). This seems consistent with the ordinary use of the word "uncertainty". In the roulette room we are not ignorant about the probabilities which are to be assigned to the various alternative events; yet there is uncertainty even there about each single event.

On the other hand the fact that in ordinary life, outside games of chance, the frequency distributions are not exactly known, we denote as *ignorance*. A discussion of how, in the light of the Theory of Inference, we may measure the degree of ignorance, and how it affects the prices and holdings of assets, must be left for another occasion.

² Compare I. Fisher. *Capital and Interest*. 1906. App. to Ch. XVI, 10.

A. C. Pigou. *Economics of Welfare*. 1920. App. I.

P. S. Florence. *Statistical Methods in Economics and Political Science*. 1929. Ch. XVIII, 4.

J. R. Hicks. *ECONOMICA*. May 1931 and February 1935.

Leyden meeting of Econometric Society, 1933 (reported in *Econometrica*, 1934).

K. Menger. *Zeitschrift für Nationalökonomie*. 1934.

value (mode), the mathematical expectation (mean or actuarial value), the mid-point between the extreme values, etc. As a measure of dispersion the difference between the extreme possible values (range) divided by the average may be used, or alternatively the coefficient of variation (i.e., the standard deviation divided by the mean).¹ Thus for example, an investor may think that a security will most probably yield £5; but that it may yield £6 and it may yield nothing. The mode is then £5, the range £6. Or he may think it equally probable that a security will yield £2 and £8. The actuarial value or mean is then £4, the standard deviation is £2, and the coefficient of variation .5.

9. TASTES IN AN UNCERTAIN WORLD.

It was assumed earlier that a person's satisfaction depends upon the size, quality and time-distribution of his yields. But for "size" we must now substitute the two characteristics of the frequency distribution. People like yields with a high actuarial value—they like *lucrativity*.² And further, the dispersion of yields is relevant. If two expected yields of a given quality accruing in a given year have the same mean (or actuarial) value, most people prefer the one whose values do not usually deviate strongly from the mean. That is, people usually prefer safe yields and dislike risky ones. The *risk*, a disutility, may be measured by the coefficient of variation of yield; or alternatively, the *safety*, a utility, can be measured by the coefficient of variation taken with a negative sign.

¹ Our analysis is not dependent upon any particular measures selected to represent the probability distributions. Mode and range are less accurate than, for instance, the moments used in statistical work. But perhaps they correspond better to the vague way people think about expected yields.

We might, further, introduce a third characteristic of the frequency curve, its asymmetry. The economic relevance of this is mentioned in the next footnote. It may be measured by the difference between mean and mode, or between midpoint and mode (—2 in the first example cited at the end of § 8).

The analysis need not be confined to two or three characteristics, or parameters, but can be extended to any number (e.g., any number of moments). And instead of using a finite number of parameters we could use the full description of the probability distribution, stating the probabilities ascribed to each infinitely small range of values, or using the form of the function as a whole. The analysis would be unaltered in principle.

Further, as mentioned in the text, it is, strictly, the joint distribution of all yields rather than distributions of the separate yields which matter. This would mean using, in addition to the parameters attached to each variable (mean, dispersion, etc.), the parameters connecting them, such as correlation coefficients. In fact people are not indifferent as to whether there is association between simultaneous plenty and scarcity of different types of yields produced by the property in any one year (or any given quality of yields in successive years). However we shall not pursue this refinement here.

² In a world of certainty there is only one possible value for the yield which is therefore its own actuarial value.

Just as there are rates of preference between any two yields differing in time or quality, so also there are rates of preference between the mean and the dispersion of yield: we may call these rates *safety preferences*. "Audacious" people have a low safety preference. They would give up a lot of safety in exchange for a small increase in mean or lucrativity.¹ Using the individual's safety preference rate, in addition to his quality and time preference rates, we can express any expected bundle of yields in terms of a standard unit of yield, namely present lucrativity of a given quality. We can again, as in § 2, call this process discounting—in this case, discounting for risk.

10. MARGINAL LUCRATIVITY AND SAFETY.

Our previous results can now be applied to the world of uncertainty. For this generalisation we simply have to substitute for the word "yields" the words "lucrativities and safeties of yields". An investor with a given property can choose between various bundles of lucrativities and safeties of yields. This is the generalised way of stating the transformation conditions. As before, an asset's contribution to yield is in general not independent of other assets. This is illustrated by Investment Trusts. The object of an Investment Trust is to increase the safety of the whole property by properly mixing the risks attached to various assets. A gas share added to a holding of electricity shares has a greater marginal safety than if it is added to a holding of gas shares.

It is now possible to extend the concept of marginal productivity so as to make it apply to an uncertain economy. We shall call this generalised concept *marginal contribution*: an asset's marginal contribution is the most preferred bundle of lucrativities and safeties, properly discounted, resulting from the addition of one unit of the asset to a given property. Asset prices are proportionate to marginal contributions. The price of the asset chosen as numéraire is unity. The lucrativity of one unit of the standard yield is also unity.

As an illustration, suppose a person's property consists

¹ It seems also (cf. Professor Pigou, Professor Sargant Florence, Dr. Hicks) that people are not indifferent about the asymmetry of the probability distribution: of two equally lucrative and equally safe properties, the one offering a small chance of a very large gain is often preferred. Football pools are popular. "Long-odds enthusiasts" are willing to accept a considerably lower average in order to get a slightly more (positively) skew distribution.

mainly of plant. Let us first consider in what way the addition of more plant will affect expected yields. Let the most preferred contribution of the added plant be: nine units of lucrativity (discounted for time) and an amount of safety which, discounted for time and risk, is one unit of lucrativity. Suppose now that, instead of more plant, a house is added to the property and that the best yield-bundle consists of a smaller amount of lucrativity, 3, together with a larger amount of safety, say 7. The two assets then make contributions of equal value, viz., 10 lucrativity units. Therefore their present prices must be equal: the higher lucrativity of the plant is offset by its lower safety.

It now becomes clear why changes in interest rates do not materially affect investment plans, even long-term investment plans, except in the cases of housing and public utilities. The increase in lucrativity due to saving on interest payments is only one of the considerations relevant to the borrower: there is also the effect on safety. Whereas in the case of housing and public utilities the latter effect may be very small, in the case of industrial investments there may be such a large unfavourable effect on the safety of the yields from the whole property that the gain in lucrativity is outweighed by the loss in safety.

We have shown that the interest rate can be defined as the result of an arithmetical operation on the price and gross yield of a (safe) loan, like consols. The situation is analogous if we consider discounting for risk instead of for time. "The risk premium" would be that quantity which, if used to discount each successive unit of risk, would give the actual price of a (non-durable) asset. If, however, the asset is both durable and risky, the definition collapses: there is an indefinite number of pairs of interest and risk premia which, if applied in discounting a given yield series, will result in a given price. Asset prices are still perfectly determinate; but the interest rate and the risk premium are now indeterminate—we must abandon them, and we do so without regret. The fact that "interest rate" and "risk premium" vaguely suggest to us time-preference and safety-preference does not constitute a recommendation for them. The interest rate is not in general identical with any time-preference rate (see § 7) and, for analogous reasons, the risk premium is not identical with any safety-preference rate.

II. CLASSIFICATION OF ASSETS.

We may group together familiar types of actual assets—like money, shares, plant—according to the ways in which they contribute to lucrativities and safeties. We shall start with simplified conditions and then introduce imperfection of the market and uncertainty.

(a) CERTAINTY WITH A PERFECT MARKET.

In a certain world with a perfect market the marginal contributions of assets are simply their marginal productivities. All stocks are *productive* stocks. Asset prices are proportionate to these productivities. The quantities of stocks of each kind of asset held are such as to make asset prices proportionate to their marginal productivities.

It may appear that some stocks would be held in a world of certainty without contributing to productivity. For instance, an ounce of crude tin may be held simply because it is not worth while blowing-in the blast furnace. This, however, does not constitute any exception to our rule. Because of the high costs of melting small quantities, the marginal product of tin under process would be less than the marginal product of the idle stock of crude tin. What may be called *discontinuity stocks* are only an extreme case of this same phenomenon: they are therefore also a variety of productive stock. Crops ripen at a definite season. The reason why wheat is held over winter is that it is extremely expensive to grow wheat out of season, in hothouses. Ore from overseas arrives discontinuously in big ship-loads. It is cheaper to keep some ore in stock than to have it delivered in small canoes whenever it is wanted.

Thus, in a world of certainty with perfect market conditions all stocks are lucrative stocks or, more specifically, productive stocks.

(b) CERTAINTY WITH AN IMPERFECT MARKET.

With an imperfect market some stocks may be acquired because their price is expected to rise in the future. Such stocks will be called *speculative*. Their acquisition contributes to lucrativity through exchange. In the absence of uncertainty speculative stocks can only exist if the market is imperfect. For in a perfect market with full certainty (§ 4) speculation would defeat its own end: any investor

who, on going to the market, saw a possibility of speculative gains, would, by his own purchases, push up the present price to that level which he expected the future price to reach. Therefore in equilibrium no one could be expecting speculative gains. In an imperfect market, however, the investor would not push his purchases so far. He would take into account the effect of his own purchases upon price.

As a common term for speculative and productive stocks we may use the expression "lucrative stocks". As in the case of a perfect market, stocks may also be held owing to the high costs of investing small quantities—where by "investing" we now mean not only transforming physically but also exchanging in the market. Such stocks are merely a kind of lucrative stocks. In an imperfect market advertising costs arise. High brokerage charges may make the marginal product of a share with a low dividend greater than that of a share with a higher dividend.

This kind of consideration would explain the existence of some minimum stocks of cash even in the absence of uncertainty. Provided income does not accrue exactly at the same times and in the same quantities as expenditures are made, people will keep cash balances; for the cost of investing very small balances is prohibitive.

(c) UNCERTAINTY WITH A PERFECT MARKET.

In a certain world, then, assets are valued in proportion to their marginal productivities. With the introduction of uncertainty the price-relations become different. Assets are valued in proportion to what we have defined as their marginal contributions. Some assets become more highly valued, and are acquired in larger quantities, than they would be in a world of certainty. Those parts of stocks which would not have been acquired in a certain economy are usually called non-productive. Some kinds of assets which are familiar in the world as we know it would hardly be held at all in the absence of uncertainty. The considerations determining people's asset-holdings in an uncertain world are reviewed below.

(i) LUCRATIVE STOCKS.

Assets can contribute to lucrativity either by physical transformation or by exchange. Those assets acquired

because of their contribution to lucrativity without recourse to the market are *productive stocks*. They would exist in a certain as well as in an uncertain world.

Assets may be acquired because they are expected to contribute to lucrativity through future exchange. Such assets are *speculative*. They may always exist in an uncertain world; in a certain world they can only exist if the market is imperfect.

(ii) SAFE STOCKS.

Some assets are acquired because, without future exchange, they contribute to safety (i.e., reduce the dispersion of yields) more than others. Such assets may be called *safe in production*.

Further, there are assets which are acquired because their future prices are more certain than those of others (i.e., have a smaller dispersion). The small dispersion of price will make their yields after sale (consumed proceeds) less dispersed than those of other assets. Such assets may be called *safe in exchange*; they are sometimes described by the phrase "store of value". Thus money has often been called a store of value by economists who abstract from the experiences of inflation.

In so far as the yield-expectations of the various persons are based partly on the same objective facts and are therefore to some extent similar, assets with certain prices are usually those whose yield is known with some precision. Therefore assets which are safe in production are usually also safe in exchange and can be kept as stores of value. For instance the yield, and hence the price, of a bond is not subject to large dispersion; so that bonds are partly kept as a store of value.

(d) AN UNCERTAIN ECONOMY WITH AN IMPERFECT MARKET.

The introduction of market imperfection into an uncertain economy gives rise to a distinction between assets which will be more and those which will be less *saleable*.

12. FUTURE SALEABILITY.

The future saleability of any asset to a given investor depends upon two factors: the estimated degree of

imperfection of the future market and the frequency distribution of expected future sales.¹

A picture will be difficult to sell—it will be hard to find buyers; advertising costs will be high. On the other hand it will be easy to sell a single Imperial Chemicals Share of similar value. To meet a contingency, it will be easier to manoeuvre if the future market is perfect.

When an investor adds an asset of the kind A to his property, he does not know exactly how much of it he will sell out later. If it should turn out that his best policy is to sell a small quantity, say a , of A , he would get a small quantity, say β , of B in exchange. But if he should sell $2a$, $3a$, or $4a$, etc., then he would get 2β , 3β , 4β , etc., *only if* the future market is perfect (if the A 's are single shares, for instance). In an imperfect market, like that for pictures or for whole blocks of shares, he would get less than 2β , 3β , 4β , etc. It follows that for any given amount of A retained the seller will have less of B , the less perfect the market. He will therefore get smaller yields from the whole property the less perfect the market. The investor assigns probabilities to each event: selling none of A ; selling a of A ; selling $2a$ of A , etc. To this frequency distribution of amounts of A sold there corresponds a frequency distribution of yields from the property. The actuarial value of the expected yields from the property (its *lucrativity*) is evidently higher the less imperfect the market. An asset's marginal contribution is thus highest in a perfect market. The reduction in its marginal contribution—and hence in its price in terms of the numéraire—due to future market imperfection depends both on the degree of imperfection and on the form of the frequency distribution of expected sales. This reduction may be called the asset's future unsaleability, and the reciprocal its future saleability.

Our definition of saleability does not imply that an asset is exchanged against one other asset only; it may, of course, be exchanged against a number of assets. The rate at which different quantities of A will in the future be exchanged against other assets, taken in conjunction with the probabilities of the respective exchanges, determines the asset's marginal contribution and hence also its saleability.

¹ We speak of "future" saleability simply in order to emphasise that we are concerned only with *future* contingent exchanges. In our terminology there is no such thing as "present saleability". The ease with which an asset can be sold in the present market (§ 5 (c)) is not relevant to saleability in our sense. This will become clear in the present section.

It follows from our definition that saleability depends not only upon future market conditions but also on the frequency distribution of the quantities which the individual thinks it possible he may sell. The smaller the dispersion of these quantities, the greater is the asset's saleability. When times become more uncertain the dispersion increases. This, by introducing the possibility of large sales which entail large price-reductions, not only increases the dispersion of future yields, but also reduces their actuarial value. Therefore increased uncertainty will decrease the marginal contributions of assets with future imperfect markets. As uncertainty increases people try to reduce their holdings of such assets, with the result that their prices fall relatively to those of other assets: a phenomenon known as hoarding of liquid¹ assets takes place.

It should be clear from the above that saleability is not a new kind of utility additional to lucrativity and safety. Saleability is a reduction in price due to reductions in lucrativity caused by uncertainty and the imperfection of the future market.

In § 10 we considered for illustration two assets having the same price but differing in respect to the ways in which this price was built up. The table below extends this illustration. As before, the safety preference rate has been used to express safety in lucrativity units. The table refers to a single investor.

	Lucrativity		Safety (Discounted)		Asset's Marginal Contribution (Lucrativity + Safety)		Difference
	Actual.	With perfect Market	Actual	With perfect Market	Actual	With perfect Market	
Plant ..	9	20	1	3	10	23	13
House ..	3	12	7	11	10	23	13
Shares ..	9	9	1	1	10	10	0
Bonds ..	3	3	7	7	10	10	0
Cash ..	1	1	9	9	10	10	0

Let us compare first the figures under the heading "With perfect Market". There, plant appears more lucrative than shares and both are more lucrative than cash. The lucrativity may be derived via production or speculation (see § 11). On the other hand houses, bonds and cash have

¹ We should say "saleable" (§ 15 *sub finem*).

the highest safety, either because of stable yields or stable prices. They are stores of value. Consider now also the figures under the heading "Actual": we see that the fact that certain markets are more perfect than others increases the lucrativity of easily saleable assets—namely shares, bonds and cash—relatively to others.

It may be worth recalling again that the saleability or unsaleability of an asset must be distinguished from its depreciation (or appreciation). Depreciation is the excess of the future price over the present price. Saleability is the difference between an asset's actual present price and the price which it would have at present if the market in which it may be sold in the future were perfect. Speculative stocks are thus distinct from saleable stocks.¹ Further, saleability is sometimes described as the relationship between the selling price and the time which the seller must wait in order to get it. If an example is chosen where "the selling price" includes appreciation (or depreciation) saleability and speculation will again be confused. If, however, an example is chosen where there is no appreciation or depreciation, the influence of time on the selling price is due to the seller's finding more buyers (compare the concluding paragraph of § 6). In this case the price-time schedule describes the imperfection of the market and therefore, *given the frequency distribution of expected sales*, it determines saleability.

13. FUTURE PLASTICITY.²

The investor can meet an emergency either by exchanging or by physical transformation. In the first case manœuvring is easier the more perfect the future market for the asset, i.e., the less the rate of exchange will vary with the quantity exchanged. Analogously, manœuvring by physical transformation is easier the more substitutable the asset, i.e., the less the rate of transformation will vary with the quantity transformed. The investor does not know exactly what quantities of assets he will substitute by physical transformation. If he should substitute a small amount, a , of an asset A for another asset B , he would get a small

¹ This distinction is not always clearly made. See, for instance, "The Concept of Liquidity." A. M. Neumann, *Review of Economic Studies*. 1935.

² This section deals with physical transformation of assets and is therefore irrelevant to monetary theory. It is, however, important for the general theory of assets.

quantity, say β , of B . If, however, he should substitute 2α , 3α , 4α , etc., of A he will generally get less than 2β , 3β , 4β respectively of B . The rate at which he will be able to increase the quantity of one asset at the expense of another is not generally constant; it will depend on the quantity substituted (§ 4). If the rate of substitution varies strongly with the quantity substituted, the elasticity of substitution is small; if the ratio varies little the elasticity of substitution is large. In the limiting case, where the rate is constant, the elasticity of substitution is infinite. Just as we found when dealing with saleability, so here an asset's marginal contribution is found by assigning to each possible amount of A substituted, the probability that this amount will be substituted. With a given set of contingencies, the less the rate of substitution is expected to vary with the amount substituted, the greater the asset's marginal contribution—because the investor reckons to be able to manœuvre with a smaller sacrifice of yields. An asset's future "unplasticity" can be measured by the difference between what its price would be if its elasticity of substitution were infinite, and its actual price. The reciprocal of this quantity is the asset's future *plasticity*.¹

The fact that an asset has a relatively perfect market and high elasticity of substitution for all other assets would not, in itself, be sufficient to cause people to hold stocks of this asset if there were no uncertainty about the future. But if there is uncertainty then, for every given frequency distribution of contingencies, future saleability is greater the more perfect the market, and future plasticity is greater the greater the elasticity of substitution.²

The reason why producers find it profitable to hold large stocks of raw cotton, but not to hold large stocks of finished cotton goods, is that it is easier to transform raw cotton into a large range of alternative products. It must of course be remembered that an asset's marginal contribution, and therefore its plasticity, depends on the other assets possessed by the investor. Even raw cotton has no particular advantages of high plasticity to a tin-smelting firm.

¹ In our terminology there is no such thing as present plasticity. The reason why we sometimes use the adjective "future" is the same as in the case of saleability. (See p. 278 footnote.)

² In geometrical terms, given the frequency distribution of expected sales or transformation, saleability depends on the curvature of the market line, and plasticity, in an exactly analogous way, on the curvature of the transformation line.

We could now add the assets raw cotton and cotton goods to our table in § 12, as follows :

	Lucrativity		Safety (Discounted)		Asset's Marginal Contribution (Lucrativity plus Safety)		Difference
	Actual	With perfect Market or Substitutability	Actual	With perfect Market or Substitutability	Actual	With perfect Market or Substitutability	
Raw Cotton	2	2	8	8	10	10	0
Cotton Goods	2	3	8	9	10	12	2

14. TYPES OF ASSET: SUMMARY.

Assets may be classified according to the reasons which make people acquire and keep them. These reasons, which also determine the asset prices, may be different in perfect and imperfect markets, and, again, in certain and uncertain economies; also, of course, an asset may be kept for several reasons at a time.

In a world of certainty with a perfect market, assets are kept only for their productivity. If the market is imperfect they may also be kept as speculative stocks. In both cases they are kept for lucrativity. What we have called "discontinuity stocks" are a special case of lucrative stocks; they arise from the prohibitive costs of investing small quantities, i.e., transforming them into other assets either physically or by exchange.

In an uncertain economy stocks are held not only for their lucrativity (in production or exchange) but also for their safety: and again, stocks may be safe in production or in exchange. In an uncertain world, with a given set of contingencies, prices and/or quantities are lower the less perfect the market and the less physically transformable the asset is expected to be in the future.

III. MONEY AND OTHER ASSETS

15. CASH HOLDINGS.

Let us consider, in the light of the preceding discussion, what determines people's cash-holdings.

Cash cannot be held for productivity. It may be held speculatively, if prices are expected to fall: postponed expenditure may be expected to add more to the utility derived from the property than the utility obtainable by present expenditure on consumption.

Owing to the high cost of investing small quantities, cash may also be held without expectation of a fall in prices. This is important because of the intervals which usually exist between an investor's receipt of income and his various expenditures. Thus cash-holdings due to such intervals appear as a special—and important—case of lucrative stocks.

The two above reasons for holding cash might exist even in the absence of uncertainty. They are, however, not the most important or characteristic reasons for holding cash. In fact many other assets are kept for the same reasons to at least as large an extent as cash. People frequently hold goods for appreciation in terms of other goods. Also raw materials often lie in stock because of the high cost of investing small quantities; whenever delivery is made discontinuously and does not exactly synchronise with outgoings, there will be stocks.

There are, however, two qualities which, in the eyes of investors, cash possesses in an especially high degree. These are safety and future saleability.

In times of monetary stability cash is held because it is safe in exchange—at least it is believed to be so by those who forget the experiences of inflation. This is the quality of money which economists have often described as a "store of value".

Second, cash possesses in a high degree the property of future saleability. This may be illustrated by contrasting cash with houses. When an investor sells out his house-property, he is likely by his own action to depress the price of houses in terms of other goods, because there are relatively few buyers of houses. When he "sells out" his cash he does not noticeably depress its price in terms of other goods, because there are many buyers of cash. The saleability of cash is presumably what was meant by economists when they praised it as a "good medium of exchange" owing to its universal, or almost universal, acceptability.¹ It does not matter, of course, whether the saleability of cash is due to law or custom. The market for cash is more nearly perfect than that for other assets.

It is clear that the future saleability of cash has nothing to do with appreciation (§ 12). Cash may still be saleable even when it is depreciating.

¹ See Jevons, *Money*. 1875.

Wicksell, *Lectures on Political Economy*. Volume 2, Introduction.

Marshall, *Money, Credit and Commerce*. Bk. I, Ch. 1.

Mises, *The Theory of Money and Credit*. Part I, Ch. I., etc.

These two properties, safety and future saleability, which money possesses in a higher degree than many other assets, are often lumped together under the name of "liquidity". Those assets are said to be liquid which are in some way like cash. Thus liquidity is used to denote "being like cash". But since the two properties do not necessarily go together, two terms are required in order to avoid ambiguity.

It may occur to the reader that the term liquidity might be chosen to denote future saleability¹: the word would indeed suggest the fact that money is easily transformable (on the market) into other assets and is thus an effective instrument for manœuvring. This terminology would be justified by the metaphorical allusion conveyed by the word "liquid" and its opposite "frozen": liquids change shape more easily than solids. However, "liquidity" has so often been used to cover all properties of money indiscriminately that it seems better not to use it for any of the separate properties of money. We thus resign ourselves to giving up "liquidity" as a measurable concept: it is, like the price level, a bundle of measurable properties.

16. "THE VELOCITY OF CIRCULATION." "THE LIQUIDITY POSITION."

Once the factors determining cash-holdings have been analysed it would be mere arithmetic to take the ratio of cash-holdings to income—the well-known Cambridge k ; or its reciprocal—the notorious Income Velocity of Circulation; or the proportion of cash-holdings to other items in the balance sheet—the so-called liquidity position of firms.

In fact these derived magnitudes become unnecessary tools if we have direct access to the fundamental variables: asset holdings of all kinds including cash; prices; yields (i.e., quantities consumed). In order to explain prices it is not necessary to bring cash-holdings into relation with income. The very concept of income can be dispensed with and has not been used here. The quantities we need are the amounts of various commodities and services consumed in various time intervals, and the asset holdings. To introduce the concept income would be merely to reduce the amounts consumed, and the changes in asset holdings,

¹ As in *Kapitalbildung* (by J. Marschak and W. Lederer), pp. 8–10.

to a single quantity by the use of some ill-defined index-numbers. This would again be mere arithmetic, and not even very sound arithmetic. For certain purposes the reduction of the multiplicity of yields and assets to imaginary entities like consumption and investment is a useful statistical approximation; but it is an approximation which is inapplicable in practice whenever there are any considerable changes in relative prices or quantities. Such an approximation ought therefore not to be fundamental to our theory.

Similarly, the liquidity position can be described as the ratio of cash to total wealth only at the cost of neglecting important qualitative distinctions between various assets, both positive and negative.

Short-hand measures, however essential for statistical purposes, are no substitute for the causal analysis undertaken here.

17. THE RATIONALE OF "THE INTEREST RATE" AND "THE PRICE LEVEL."

To have first explicitly approached money as one among many assets is an important service rendered by Dr. Hicks to modern economic theory.¹ The present analysis shows the connection between two aspects of monetary theory which textbooks usually put into watertight compartments: the theory of the price-level of commodities in terms of money, and the theory of the interest rate. The first aspect is treated under captions such as "The Quantity Theory of Money," "The Equation of Exchange," "The Velocity of Circulation," and "The Value of Money." The second compartment works with concepts like "The Price of Loans," "The Price of Waiting," "Liquidity Premium," and sometimes—rather unclearly related to "The Value of Money" of the first compartment—"The Price of Money." But in fact one and the same thing is treated in the two compartments. Given tastes, transformation conditions and market conditions, as defined above, the quantity of cash held, and its price in terms of each of the other assets, are simultaneously determined. These other assets may be commodities bought for immediate consumption, goods bought as a source of future consumption, or claims. In discussing the value of money one or other of these groups

¹ *ECONOMICA*, 1935. "A Suggestion for Simplifying the Theory of Money."

of assets has been isolated by writers. The prices of immediate consumption goods have been singled out and submitted to arithmetical operations of index-number computation; prices of other goods like raw materials, houses and land being sometimes added in, sometimes excluded, the so-called price level was obtained. On the other hand claims were bundled together—with or without an admixture of houses and land—and their prices described under the rubric "Interest Rate." Or sometimes separate bundles of claims, classified according to their duration, were made up, and a kind of average "short-term interest rate" and average "long-term interest rate" were calculated. The difference between the short- and long-term rate was vaguely associated with the risk premium, although the measurement of the price of risk obviously presupposes the fixing of a unit of risk, which was not done.

Strictly speaking, there is a multiplicity of asset prices. We may, however, depart from this purist standpoint and venture out into approximations, grouping or ranking assets in whatever way is relevant to the problem in hand; but then we must always remember that this procedure implies the use of the concept of a "representative investor" with given expectations and tastes. Bearing this in mind we may, for instance, isolate the influence of risk on price by comparing two asset-groups which differ from each other little except in respect to their (marginal) safety. Similarly, if we can find two asset-groups differing little except in respect to the year in which their yield accrues, we can roughly isolate the influence of the time of yield upon price—always assuming that investors' expectations are sufficiently uniform to allow us to interpret them as the expectations of the "representative investor". This is the rationale of the market rate of interest and the market risk premium.

Similarly, indices of "real income" are used as approximate measures of total utilities. Assets have no utilities, and there is, strictly, no market price which expresses the ratio of utilities of two yields. Yields are not traded, and assets, which are traded, give rise in general to bundles of yields. However, an approximation to the ratio of the utilities of two yields is given by the relative prices of two assets with negligible future yields and negligible risk—i.e., of two so-called non-durable consumption goods. Still assuming that all investors have the same expectations and tastes,

and that gross yields do not vary very much in time or quality, an approximate measure of the relative utilities of the yields from two properties, or from all the properties in two economies could be obtained. We could then take as our measure simply the annual yield or (as yields are not traded) the annual quantity of consumption goods bought. This measure is probably at the back of economists' minds when they say that in order to measure real income we must use, not some general index, but an index of the cost of living. All indices are, however, only simplifications which are more or less liable to become unusable in the real world, owing to the non-uniformity of tastes and expectations, the inconstancy of the yield-flow through time and its variability in composition. We must therefore have a theory which does not collapse at the introduction of a touch of realism.

18. CHANGING DATA.

Changes in (relative) prices and in quantities of assets, including cash, may be due to changes in any of the data, viz., to changes in tastes, changes in transformation conditions or changes in market conditions. It will be remembered that all these data are subjective, and changes in them may be due to mere changes in mood. Individuals' tastes may shift—for instance, safety preferences may decline. People will then reduce their reserves of cash and other safe assets; they will dishoard and drive up prices of, say, shares in terms of bonds and cash. On the other hand, a revision of the estimates of transformation conditions will cause the choice of yield-bundles which the investors regard as open to them, to change. For example, they may reduce their estimate of the difference in safety between, say, cash, bank notes, call money, bonds, on the one hand, and houses, durable plant, shares, on the other. In this case again the price of cash and the other assets in the first group will fall relatively to the prices of the second group. Further, if for any reason people's estimates of the degree of perfection in the market for, say, houses, increases, the price of houses will rise; there will be dishoarding of cash, etc. If all yields become less safe the prices of saleable and plastic assets will rise relatively to those of others. Empirically, it is very difficult to ascribe dishoarding to a change in one particular type of data.

We can regard banks as individuals, and consider an increase in the note issue or in bank deposits as a result of decreased safety preference, or revision of estimated data, on the part of the banks. As before, there will result a rise in the price of other assets in terms of money. These considerations provide a link between the Quantity Theory of Money and the Theory of Asset Prices.

We have described how prices and quantities of assets at any given moment are determined by the data at that moment. In particular we have tried to show how the explanation of money prices and cash balances is to be found in the general theory of asset prices and quantities. A dynamic analysis, which is an explanation of the time sequence of prices or quantities, has not been attempted. Dynamic analysis implies additional hypotheses about how the data at one moment depend upon prices and quantities in preceding moments. It presupposes an inquiry, of the kind undertaken here, into the mechanism by which prices and quantities at each moment are determined by the data at that moment.

The Analysis of Vital Statistics

By R. R. KUCZYNSKI

II

BIRTH AND DEATH STATISTICS

Date of Occurrence versus Date of Registration

IN official statistics births and deaths are tabulated either according to the date of registration or according to the date of the event. From an administrative standpoint the former method is more convenient because, no matter how much registration is delayed, final results can be published immediately after the end of the period under consideration. From a demographic standpoint, however, this method is unsatisfactory because the fluctuations in the numbers of birth and death registrations do not necessarily correspond to the fluctuations in the actual numbers of births and deaths. Australia, where births and deaths are tabulated according to the date of registration, has published in addition for 1911-1920 the number of births according to the date of occurrence. Table VII shows the results by months.

The greatest difference between the numbers of registered and of actual births occurred in November, 1912, when 14,678 births were registered while only 10,010 children were born. The inflation in registrations was due to the fact that the law relating to Maternity Allowances, which came into force on 10 October, 1912, materially diminished the period between the dates of birth and the dates of registration as the certificate of registration must be produced when a claim under the Act is lodged. The acceleration of registration started in October, 1912, when registrations exceeded births by 10.6 per cent. In 13 more months the difference exceeded ± 5 per cent. In only 21 of the 120 months was it less than ± 1 per cent. The yearly registrations outnumbered the yearly births by 4.5 per

TABLE VII.
BIRTHS ACCORDING TO DATE OF REGISTRATION AND ACCORDING TO DATE OF OCCURRENCE,
AUSTRALIA, 1911-1920.

<i>Month</i>	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920
					REGISTERED BIRTHS.					
January	9,867	10,788	11,635	11,269	10,800	10,698	11,595	11,016	10,818	10,606
February	9,287	9,777	10,416	10,496	10,573	10,880	9,958	9,784	9,714	9,533
March	10,446	10,480	11,289	11,825	12,511	11,190	11,421	9,758	10,452	11,176
April	9,293	10,327	11,484	11,429	11,625	9,901	10,428	10,909	10,087	10,476
May	10,845	10,738	11,456	11,241	11,605	11,678	11,492	10,939	10,338	11,193
June	10,207	10,058	11,113	11,709	11,778	11,032	11,079	10,336	9,530	11,970
July	10,435	11,226	11,658	12,410	11,735	11,212	11,475	11,121	10,406	12,369
August	11,078	11,425	11,399	12,537	11,287	11,758	11,702	10,957	10,146	12,369
September	10,422	10,513	11,739	11,636	11,277	11,063	10,610	10,572	10,470	11,867
October	10,582	11,942	11,753	11,654	10,563	11,262	10,983	10,878	10,359	11,502
November	10,187	14,678	10,546	10,568	10,652	10,542	9,823	9,730	9,602	11,537
December	9,544	11,136	11,226	11,209	10,465	10,210	9,399	9,739	10,368	11,363
TOTAL	122,193	133,088	135,714	137,983	134,871	131,426	129,965	125,739	122,290	136,406

ACTUAL BIRTHS.

<i>Month</i>	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920
January	10,019	10,158	10,711	11,352	11,181	11,163	11,170	10,549	10,584	10,474
February	9,120	10,035	10,249	10,591	10,711	10,501	9,972	9,526	9,585	9,965
March	10,381	10,620	11,567	11,912	12,073	10,938	11,185	10,490	10,660	10,763
April	10,119	10,219	10,971	11,282	11,633	10,855	10,713	10,469	10,243	10,765
May	10,439	10,811	11,313	11,602	11,778	11,106	11,379	10,839	10,092	11,556
June	10,319	10,931	10,937	11,497	11,514	10,989	11,155	10,517	9,917	12,190
July	10,840	11,235	11,421	12,308	11,535	11,441	11,542	10,963	10,252	12,700
August	10,738	11,004	11,681	12,075	11,360	11,346	11,524	10,889	10,384	12,339
September	10,391	10,821	11,506	11,656	11,152	11,383	10,927	10,631	10,107	11,709
October	10,421	10,801	11,487	11,462	10,855	10,995	10,323	10,530	10,255	11,911
November	9,885	10,010	10,805	10,593	10,196	10,419	9,888	9,586	10,255	11,100
December	10,246	10,705	10,979	10,956	10,711	10,944	10,183	10,267	10,261	11,572
TOTAL	122,918	127,350	133,627	137,286	134,699	132,080	129,961	125,256	122,310	137,044

cent. in 1912 and by 1.6 per cent. in 1913. But in no other year did the difference exceed ± 0.6 per cent. It may then seem that the harm done by basing the yearly birth and fertility rates on the number of registered births should be irrelevant. But this is actually not so. The official birth rates for the ten years 1911-1920 read as follows :

27.20, 28.60, 28.15, 27.90, 27.06, 26.57, 26.27, 25.00,
23.53, 25.45.

Even the most cautious writers have been deceived by the official figures and have concluded that the highest fertility was reached in 1912,¹ while the actual birth rates (which have not been published) showed the following trend :

27.36, 27.36, 27.72, 27.76, 27.02, 26.70, 26.27, 24.91,
23.54, 25.57.

All the official birth figures and birth rates for Australia are then only more or less close approximations to the truth. The official birth rates for 1932-1935 were 16.86, 16.78, 16.39 and 16.55. The actual birth rates were probably higher in 1932-1933 than in 1934-1935. But we do not know for sure which year had the highest and which year the lowest birth rate.

The uncertainty is much greater still for England and Wales. In Australia the average interval between birth and registration dropped from 37 days in 1911 to 16 days in 1913. In 1914-1920 it oscillated around 13 days. For England and Wales the Registrar-General's *Statistical Review* states year-in year-out : "The average time lag between occurrence and registration is usually about a month." It is obvious that the greater the average time-lag the greater is the probable divergency between actual and registered births. Exactly how important these divergencies are in this country it is impossible to tell since the births have never been tabulated by date of occurrence. But it is easy to prove that the divergencies must be enormous, at least within short periods. In the Great Towns of

¹ See, for example, Dr. McCleary, "Population Problems in the British Commonwealth", *Eugenics Review*, April, 1938, p. 49 : "In 1904, when the report of the Royal Commission appeared, the Australian birth-rate was 26 per 1,000. It rose slowly to 28.5 in 1912. The rapid fall in fertility was then resumed . . ." Or see Enid Charles, "The Changing Structure of the Family in Australia", *Economica*, August, 1937, p. 246 : "During the period studied [1909-33] the highest point was reached in 1912, with a gross reproduction rate of 1.781. From this year fertility fell steadily . . ." The gross reproduction rates for 1911-1914 are given as 1.692, 1.781, 1.745, and 1.732. If one substitutes the actual births for the registered births the gross reproduction rates read as follows : 1.702, 1.704, 1.718, and 1.723. Naturally no writer who uses official birth figures can be expected first to study the changes in the rapidity with which parents may have secured birth certificates.

England and Wales 5,750 births were registered in the week ended December 21st, 1935; the number dropped to 3,677 in the week ended December 28th, and jumped to 6,786 in the following week. It is true that the fluctuations around Christmas are exceptionally large. But the experience of Australia shows that the fluctuations are sometimes considerable even for the same quarter of two consecutive years. The number of registrations there dropped from the second quarter 1918 to the second quarter 1919 from 32,184 to 29,955, or by 6.9 per cent., while the actual number of births declined only from 31,825 to 30,252, or by 4.9 per cent. It may well be, therefore, that in England and Wales, where the average interval between birth and registration is much greater, sometimes even the yearly changes in the numbers of registered births convey a distorted picture of the actual changes in natality. The number of registered births dropped from 613,972 in 1932 to 580,413 in 1933 and rose again to 597,642 in 1934. The number of registrations in the last quarter of 1933 (129,810) was over 10,000 lower than in any other quarter from 1850 to this day. It is possible, of course, that the number of births was actually as low in the last quarter of 1933 as indicated by the official statistics.¹ But until the proof of the contrary it seems safer to assume that the drop in the actual number of births in 1933 was smaller than the drop in the number of births registered in that year. The official birth rates in 1933-1937 were 14.4, 14.8, 14.7, 14.8 and 14.9. It may well be that the actual birth rate in 1933 was not lower than in 1935. And which year had the highest birth rate is anybody's guess.

With regard to deaths, the statement published each year in the Registrar-General's *Statistical Review* reads "The time lag between occurrence and registration is usually only a day or two." But it would seem that the exceptions from this rule are sometimes extraordinarily

¹ However, the suspicion that registration of births occurring in the last quarter of 1933 was unusually delayed is strengthened by the fact that registrations in the first quarter of 1934 were more numerous than in the first quarter of either 1935, 1936, or 1937. Registrations, it is true, were more numerous still in the first quarter of 1938 than in the first quarter of 1934. But this may have been due to an acceleration in registration which apparently was particularly notable in January—perhaps owing to the interest in registration aroused by the public discussion of the Population (Statistics) Bill. (In the Great Towns registrations in the four weeks ended January 1st, 1938, were 0.3 less than in the four weeks ended January 2nd, 1937; they were 10.1 per cent. more numerous in the four weeks ended January 29th, 1938, than in the four weeks ended January 30th, 1937; and they were 2.5 per cent. more numerous in the 22 weeks ended July 2nd, 1938, than in the 22 weeks ended July 3rd, 1937.)

numerous. The last month for which the deaths by date of occurrence have been published is September, 1936. A comparison of the numbers of registered and of actual deaths leads to the following results :

<i>Quarter ended</i>	<i>Registered</i>	<i>Occurred</i>	<i>Difference</i>
Dec., 1934 ..	114,331	113,493	+ 838
March, 1935 ..	132,657	134,194	— 1,537
June, 1935 ..	121,935	121,253	+ 682
Sept., 1935 ..	100,066	98,913	+ 1,153
Dec., 1935 ..	122,743	123,698	— 955
March, 1936 ..	153,591	153,011	+ 580
June, 1936 ..	119,540	119,105	+ 435
Sept., 1936 ..	99,935	99,928	+ 7

	<i>Per cent. changes</i>			
	<i>Registered</i>		<i>Occurred</i>	
From 4th quarter, 1934, to 4th quarter, 1935	+	7.4	..	+ 9.0
From 1st quarter, 1935, to 1st quarter, 1936	+	15.8	..	+ 14.0
From 2nd quarter, 1935, to 2nd quarter, 1936	—	2.0	..	— 1.8
From 3rd quarter, 1935, to 3rd quarter, 1936	—	0.1	..	+ 1.0

It is evident that, even when the time-lag between occurrence and registration is "usually" only a day or two, registration statistics are no adequate substitute for vital statistics.

It should be realised finally that the risk of deceptions is greatest if registered deaths are related to registered births. By relating the number of registered deaths under one to the number of registered births of the same calendar year the Australian Bureau of Census and Statistics obtained for 1911-1914 infant mortality rates of 68.5, 71.7, 72.2 and 71.5 respectively. If the registered births are replaced by actual births, the rates are 68.1, 75.0, 73.3 and 71.8. The *Quarterly Returns* of the Registrar-General for England and Wales contain a section, "Natural Increase or Decrease". In the most recent Return, the one for the 13 weeks

ended April 2nd, 1938, this section reads: "The natural *increase* of population by excess of births over deaths was 17,343 as against a natural *increase* of 13,706 in the corresponding quarter of 1935, and natural *decreases* of 5,556 and 18,309 in the corresponding quarters of 1936 and 1937." It is obvious that the quarterly excess of birth registrations over death registrations is an utterly inadequate gauge for measuring the excess of births over deaths and that an excess of death registrations over birth registrations may well occur in a period of natural increase.

The Analysis of Birth Statistics

Until about 1930 the frequency of births was measured in official statistics according to the same principles as the frequency of marriages. In countries where the age of mothers at birth was not recorded, fertility was measured by relating the number of births to the number of inhabitants (crude birth rate) or to the number of women at child-bearing age (general fertility rate), the latter information being supplemented as a rule by the ratio of legitimate births to married women and the ratio of illegitimate births to unmarried women. In countries where the age of mothers at birth was ascertained, specific fertility rates were computed for the various age groups or even for each year of age; but these disconnected rates did not throw any light on fertility as a whole.

To-day the situation is quite different. In most countries where the age of mothers at birth is recorded, a very simple device is used for fusing the specific fertility rates into one numerical expression,¹ and the realisation that by this means they may obtain a clear picture of the fertility of their people has induced many countries which formerly did not ascertain the age of mothers at birth now to collect this information.² Since 1936 the Economic Intelligence Service of the League of Nations has published every year a survey for all the countries providing the necessary basic data.³

¹ I suggested this device and applied it to the birth statistics of Sweden 1891-1900 and Berlin 1896-1900 in a paper submitted to the International Congress on Hygiene and Demography held in Berlin, 1907 (see *Bericht*, Vol. III, pp. 1472-1484; reprinted in *Jahrbücher für Nationalökonomie und Statistik*, Third Series, Vol. XXXV, pp. 229-241).

² The United Kingdom has followed suit on 1st July, 1938.

³ See *Statistical Year-Book of the League of Nations*, 1935-36, pp. 50-57; 1936-37, pp. 44-51; 1937-38, pp. 51-59.

TABLE VIII.
TOTAL FERTILITY AND REPRODUCTION, AUSTRALIA, 1920-1922.¹

Years of Age	Females 4th April, 1921	Births Average 1920-22	Births per 1,000 Females	Female Births Average 1920-22	Female Births per 1,000 Females	Births, Average 1920-22		Births per 1,000 females		Females in Stationary Population		Female Births in Stationary Population	Years of Age
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
12	51,374	1	0.02	—	—	1	—	—	0.02	—	—	910.35	—
13	51,545	5	0.10	3	0.06	5	—	—	0.10	—	—	909.26	0.05
14	49,860	27	0.54	12	0.24	22	5	—	0.44	0.10	—	908.12	0.22
15	48,205	78	1.62	39	0.81	57	18	3	1.18	0.38	0.06	906.87	0.73
16	47,966	319	6.65	132	3.17	175	111	33	3.64	2.32	0.69	905.48	2.87
17	44,768	840	18.76	399	8.91	307	384	149	6.85	8.58	3.33	903.90	8.06
18	45,668	1,812	39.68	859	18.81	471	767	574	10.31	16.80	12.57	902.11	16.97
19	42,673	3,009	70.51	1,482	34.73	562	1,091	1,356	13.16	25.57	31.78	900.11	31.26
20	47,648	4,169	87.50	2,006	42.10	575	1,164	2,430	12.07	24.44	50.99	897.93	37.80
21	48,308	5,502	113.89	2,652	54.90	538	1,259	3,705	11.14	26.07	76.68	895.59	49.17
22	45,381	6,527	143.83	3,167	69.79	469	1,077	4,981	10.33	23.73	109.77	893.12	62.33
23	44,988	7,230	160.71	3,520	78.24	422	848	5,960	9.38	18.84	132.49	890.51	69.68
24	46,958	7,780	165.68	3,760	80.07	356	675	6,749	7.58	14.38	143.72	887.79	71.09
25	47,393	8,060	170.07	3,920	82.71	306	564	7,190	6.45	11.90	151.72	884.95	73.20
26	47,644	8,396	176.22	4,087	85.78	278	453	7,665	5.83	9.51	160.88	882.00	75.66
27	48,041	8,149	169.63	3,966	82.55	229	339	7,581	4.78	7.05	157.80	878.93	72.56
28	47,953	8,172	170.42	3,955	82.48	204	278	7,690	4.26	5.79	160.37	875.76	72.23
29	45,969	7,768	168.98	3,761	81.82	165	225	7,378	3.59	4.90	160.49	875.51	71.38

30	47,444	7,549	159.11	3,650	76.93	185	169	7,195	3.89	3.56	151.66	869.18	66.87	30
31	42,609	6,484	152.17	3,151	73.95	130	109	6,245	3.05	2.56	146.56	865.77	64.02	31
32	46,882	6,545	139.61	3,186	67.96	132	108	6,305	2.82	2.30	134.49	862.32	58.60	32
33	42,974	5,812	135.24	2,831	65.88	126	78	5,608	2.93	1.82	130.49	858.78	56.44	33
34	41,583	5,373	129.21	2,618	62.96	114	68	5,191	2.78	1.64	124.84	855.14	53.84	34
35	40,418	4,865	120.37	2,374	58.74	115	54	4,696	2.84	1.34	116.19	851.38	50.01	35
36	40,518	4,429	109.31	2,148	53.01	89	54	4,296	2.21	1.08	106.02	847.46	44.93	36
37	37,259	3,782	101.51	1,869	50.16	83	34	3,665	2.23	0.92	98.36	843.40	42.31	37
38	37,136	3,543	95.41	1,741	46.88	79	27	3,437	2.12	0.73	92.56	839.21	39.34	38
39	34,613	2,930	84.65	1,419	41.00	64	17	2,849	1.85	0.49	82.31	834.95	34.23	39
40	36,621	2,358	64.39	1,146	31.29	51	20	2,287	1.38	0.55	62.46	830.61	25.99	40
41	33,394	1,671	50.04	818	24.50	25	12	1,634	0.75	0.35	48.94	826.22	20.24	41
42	31,582	1,414	44.77	692	21.91	34	6	1,374	1.09	0.19	43.49	821.79	18.00	42
43	29,576	948	32.05	453	15.32	19	5	944	0.65	0.17	31.23	817.26	12.52	43
44	30,049	561	18.67	281	9.35	13	2	546	0.44	0.06	18.17	812.60	7.60	44
45	29,194	321	10.99	158	5.41	6	2	313	0.21	0.07	10.71	807.79	4.37	45
46	27,281	148	5.43	74	2.71	3	—	145	0.11	—	5.32	802.76	2.18	46
47	25,892	73	2.82	37	1.43	2	—	71	0.08	—	2.74	797.51	1.14	47
48	28,388	37	1.30	16	0.56	1	—	36	0.04	—	1.26	791.97	0.44	48
49	24,953	10	0.40	5	0.20	1	—	9	0.04	—	0.36	786.13	0.16	49
50	27,289	2	0.07	1	0.04	—	—	2	—	—	0.07	779.96	0.03	50
51	24,206	—	—	—	—	—	—	—	—	—	—	—	—	51
52	24,115	1	0.04	—	—	—	—	1	—	—	0.04	—	—	52
TOTAL	—	136,700	3,122.37	66,408	1,517.36	6,414	10,013	120,273	142.57	218.19	2,761.61	—	1,318.52	TOTAL

¹ It has been assumed that the number of birth and death registrations in 1920-22 was identical with the actual number of births and deaths.

Specific fertility rates are fused into one numerical expression by simple addition. The sum thus obtained—which is called the total fertility—indicates exactly how many children, with fertility as it is, would be born to 1,000 women reaching child-bearing age if none of those 1,000 women died before having passed through child-bearing age. The sum, for example, of the annual fertility rates in Australia, 1920–22 ($0.02 + 0.10 + 0.54$, etc.), is 3,122.37, and means that, with fertility as it was in 1920–22, 3,122 children would be born to 1,000 women passing through child-bearing age (see Table VIII, col. 3).

The total fertility thus ascertained may be subdivided in manifold ways. One may distinguish, for example, between male and female births. For this purpose both the number of boys and the number of girls borne by mothers of each specific year of age are related to the total number of females of that age. In order to save space, I show here the procedure only for girls (see cols. 4 and 5). It appears that with fertility as it was in Australia, 1920–22, 1,517 girls would be born to 1,000 women passing through child-bearing age. The average number of girls born to a woman passing through child-bearing age would be 1.52. This rate is called the *gross reproduction rate*. Wherever it is below unity, fertility is so low that even if no newly-born girl died before having passed child-bearing age the female population would not replace itself.

One may also subdivide the births, for example, into illegitimate births, legitimate births conceived before marriage, and legitimate births conceived after marriage. It appears that of the 3,122 children born to 1,000 women passing through child-bearing age, according to fertility in Australia 1920–22, 143 were illegitimately born, 218 born legitimately but conceived before marriage,¹ and 2,762 born legitimately and conceived after marriage (see cols. 9, 10 and 11).

A particularly instructive subdivision of the births is

¹ Of the 390,859 children legitimately born in Australia 1920–22, 23,839 were recorded as born in the first seven months of marriage, 6,593 in the eighth month, 5,419 in the ninth month, and 355,008 after the ninth month. I have assumed that all children born in the first seven months, two-thirds of those born in the eighth month, and one-third of those born in the ninth month were conceived before marriage.

If the same principles are applied to the statistics of Sweden, 1932–1934, it appears that of the 1,726 children born to 1,000 women passing through child-bearing age 252 are illegitimately born, 235 born legitimately but conceived before marriage, and 1,239 born legitimately and conceived after marriage.

that into first and later births. But unfortunately very few countries provide the necessary basic data. The procedure may be illustrated by the example of Czechoslovakia, 1925-27 (Table IX). It appears that of the 2,916 children born to 1,000 women passing through child-bearing age, 869 were first children. This means that only 131 of 1,000 (married or unmarried) women passing through child-bearing age remain childless.¹

TABLE IX.

TOTAL FERTILITY, CZECHOSLOVAKIA, 1925-1927.²

Years of Age	Females	Total Births	First Births	Later Births	per 1,000 Females		
					Total Births	First Births	Later Births
15-19 ..	775,548	18,828	16,530	2,298	24.28	21.31	2.97
20-24 ..	710,519	100,561	58,356	42,205	141.53	82.13	59.40
25-29 ..	650,849	108,539	30,171	78,368	166.77	46.36	120.41
30-34 ..	553,509	71,520	9,363	62,157	129.21	16.92	112.29
35-39 ..	479,663	39,545	2,685	36,860	82.44	5.60	76.84
40-44 ..	437,520	15,098	572	14,526	34.51	1.31	33.20
45-49 ..	398,372	1,793	58	1,735	4.50	0.15	4.35
TOTAL ..	4,005,980	355,884	117,735	238,149	583.24 × 5 2,916.2	173.78 × 5 868.9	409.46 × 5 2,047.3

The Analysis of Death Statistics

In all official statistical publications mortality is measured either by ascertaining the force of mortality, i.e. the ratio of deaths to the mean population of the period under consideration, or by ascertaining the probability of dying, i.e. the proportion of those who die among those who in the period under consideration are exposed to death. The first method is used in computing the ratio of all deaths

¹ Of the 869 first children, 185 are illegitimate and 684 are legitimate. It may seem as if by dividing the number of first legitimate births by the gross nuptiality rate it should be possible to ascertain the number of first children born to 1,000 women who have married (once or more than once) and to derive therefrom the proportion of married women passing through child-bearing age who remain childless. But this is a delusion. Most of the illegitimate first children are borne by women who marry later. Or to put it otherwise: The figure of 684 legitimate first children is so small because if a wife has had an illegitimate child her first birth after the wedding is recorded as her legitimate, second child, and in case she has no child after the wedding she will, of course, not appear at all among the mothers of legitimate children. Some attempts have been made to estimate the total number of first children who have been borne (before or after the wedding) by women who in the period under consideration are married—see my paper to the 1907 Congress, pp. 1483-1484, and Enid Charles, "The Changing Structure of the Family in Australia," *Economica*, August, 1937, pp. 251-253—but the margin of error in such estimates is considerable.

² Births include still-births.

to the total mean population (crude death rate) and also in computing the ratio of deaths at the various age groups over one year to the mean population living at those age groups (specific death rates). The second method is used in computing infant mortality and also in computing life tables. The ratio of all deaths to the total mean population does not convey a true picture of mortality since it disregards the age composition of the population. The death rates computed by the same method for the various age groups suffer from a similar defect as the specific fertility rates: these disconnected death rates do not throw any light on mortality as a whole. The best method then of ascertaining mortality is to compute the probability of dying at each year of age and to derive therefrom the mean expectation of life.

The probability of dying in the first year of age is usually computed by relating the deaths of a calendar year to the births of the same calendar year. This procedure would be correct if all deceased infants were born in the calendar year in which they die, i.e. if, for example, they all died on their day of birth. It is obvious, on the other hand, that if all deceased infants were born in the preceding calendar year, i.e. if, for example, they all died at the end of their first year of age, the deaths of a calendar year should be related to the births of the preceding calendar year. But since actually mortality is much higher at the beginning than at the end of the first year of age the majority of the infants deceased in a calendar year have been born in this calendar year, and a small minority in the preceding one.

There is one very simple method of relating the deaths of infants to the correct number of births. It consists in relating the number of children born in a calendar year and deceased under one (in this or the following calendar year) to the total births of the first calendar year, i.e. in relating, for instance, the number of children who were born in 1933 and died under one (either in 1933 or 1934) to the number of births in 1933. If

b' indicates the children born 1933

d' the children born 1933 and deceased 1933

d'' the children born 1933 and deceased under one year of age in 1934

q the probability for those born 1933 of dying in the first year of age

p the probability for those born 1933 of surviving the first year of age

$$q = \frac{d' + d''}{b'}$$

$$p = \frac{b' - d' - d''}{b'} \quad (7)$$

We can arrive at this result also through the following consideration: In order to survive the first year of age a child born in 1933 must first survive to the end of 1933 and then live long enough in 1934 to attain its second birthday. The probability of any 1933 live-born surviving the first year of age is therefore the probability of both these events happening. If

p' indicates the probability of surviving to the end of the calendar year of birth (1933)

p'' the probability of living long enough in the next calendar year (1934) to survive the first year of age

$$p = p' \times p''$$

If then we use the above symbols, we find

$$p' = \frac{b' - d'}{b'} \quad p'' = \frac{b' - d' - d''}{b' - d'}$$

$$\text{and } p = \frac{b' - d' - d''}{b'}$$

But the disadvantage of this otherwise quite satisfactory method is that the deaths are taken from two different years which may experience a quite different mortality, and that the ratio which is computed from only part of the deaths of both years does not adequately express mortality of either of the two years. For the purpose of ascertaining infant mortality for a given calendar year, another method, therefore, must be applied by which all deaths of infants occurring in this calendar year are related to the pertaining number of births occurring in this or the preceding calendar year.

The children who die in the first year of age in 1934 are (1) the children born in 1933 who survived to the end of 1933 but died (in 1934) before their second birthday, and (2) the children born in 1934 who died before the end of

1934. The probability of surviving in the current calendar year the first year of age (p) is therefore equal to the product of the probability for those born in the preceding calendar year who survived to the end of the calendar year of birth of surviving the first year of age (p') and the probability for those born in the current calendar year of surviving to the end of this calendar year (p''). If then

b' indicates the children born in the preceding calendar year

b'' the children born in the current calendar year

d' the children born and deceased in the preceding calendar year

d'' the children born in the preceding calendar year and deceased under one in the current calendar year

d''' the children born and deceased in the current calendar year

$$p' = \frac{b' - d' - d''}{b' - d'} \quad p'' = \frac{b'' - d'''}{b''}$$

$$p = \left(1 - \frac{d''}{b' - d'}\right) \left(1 - \frac{d'''}{b''}\right) \quad (8)$$

$$\text{and } q = \frac{b''d'' + d'''(b' - d' - d'')}{b''(b' - d')} \quad (9)$$

The error involved in computing infant mortality by relating the deaths in the current calendar year ($d'' + d'''$) to the births of the same calendar year (b'') is equal to

$$\frac{d''}{b''} \left(\frac{b'' - d'''}{b' - d'} - 1 \right). \text{ The error is zero if } \frac{b'' - d'''}{b' - d'} = 1.$$

This is the case, for example, if $b'' = b'$ and $d''' = d'$, i.e. if the births in the current calendar year are equal to the births in the preceding calendar year and the children born and deceased in the current calendar year are equal to the children born and deceased in the preceding calendar year.

Which is finally the number of births (b) to which the deaths in the current calendar year should be related? Since

$$\begin{aligned} \frac{d'' + d'''}{b} &= \frac{b''d'' + d'''(b' - d' - d'')}{b''(b' - d')} \\ b &= \frac{b''(b' - d')(d'' + d''')}{b''d'' + d'''(b' - d' - d'')} \end{aligned} \quad (10)$$

As a rule, the number of births (b) to which the deaths of infants of a calendar year ($d''+d'''$) should be related lies between the number of births in this year (b'') and the number of births in the preceding year (b'). But this is not necessarily true.¹ Let us assume $b'=1,050$, $b''=1,000$, $d'=200$, $d''=100$.

If $d''' > 320$, then $b > 1,050$.

If $d''' < 149$, then $b < 1,000$.

$$\text{Since } b - b'' = \frac{b'd''(b' - b'' + d''' - d')}{b''d'' + d'''(b' - d' - d'')}$$

$$\text{and } b - b' = \frac{b'd'''(b'' - b' + d' + d''') - b''d'(d'' + d''')}{b''d'' + d'''(b' - d' - d'')}$$

b is greater than both b'' and b' if the right hand sides of the above equations are positive values, and b is smaller than both b'' and b' if the right hand sides of these equations are negative. Hence (as explained to the author in a note by Mr. David G. Champernowne): b lies between b' and b'' , unless

$$\frac{\frac{d'}{b'} - \frac{d''' - d'}{b'' - b'}}{1 - \frac{d''' - d'}{b'' - b'}} > \frac{d'''}{d'' + d'''}$$

In countries such as England, where the number of deceased infants is not known by calendar year of birth, various devices have been used for estimating the number of births to which the deaths of infants should be related,² but all efforts have failed.³ It seems also most unlikely that a satisfactory method for computing infant mortality without the knowledge of the number of deceased infants by calendar year of birth will ever be discovered. This,

¹ The number of births to which the deaths of infants in France, 1926, should be related was actually slightly higher than both the births of 1925 and 1926.

² See R. R. Kuczynski, *The Measurement of Population Growth*, pp. 172-177, London, 1935.

³ A particularly inadequate device is used in connexion with the official life tables. The Government Actuary relates the number of deaths under three months of age registered in a given quarter to one-half the sum of the births registered in the same and the preceding quarter, etc. (see *The Registrar-General's Decennial Supplement, England and Wales 1931*, Part I, *Life Tables*, p. 28, London, 1936). But since the majority of the infants dying in the first three months of life die in the first week very few only of the children dying under three months of age in the course of a quarter have been born in the preceding quarter. Moreover, for many of the infants exposed to death in a given quarter birth registration takes place only in the following quarter. It would thus seem rather more important to take account of the births registered in the following quarter than of those registered in the preceding quarter.

however, is no cause for regret since the date of birth is always recorded on the registration forms and since there is no reason whatsoever why the number of deceased infants should not be shown by calendar year of birth.

The probability of dying above one year of age is computed by the formula

$$q_n = \frac{D_n}{F_n + \frac{1}{2}D_n}$$

where D_n indicates the (female) persons dying at age n years and F_n the mean number of (female) persons n years old.

If l_1 indicates the (female) children surviving the first year of age

$$l_2 = \frac{F_1 - \frac{1}{2}D_1}{F_1 + \frac{1}{2}D_1} \times l_1^1$$

This method may be illustrated by the example of female mortality in England and Wales 1936.

BASIC DATA

Registered births, 1936: 294,687; Registered deaths under one, 1936: 14,863.

<i>Years of age</i>			<i>Mean Population</i>			<i>Registered Deaths</i>	
1	..	..	272,700	..	..	2,727	
2	..	..	267,100	..	..	1,258	
3	..	..	272,800	..	..	882	
etc.							

$$\text{Surviving 1st year: } \frac{14,863}{294,687} \times 1,000 = 949.56.^2$$

$$\text{Surviving 2nd year: } \frac{272,700 - (2,727 \times 0.5)}{272,700 + (2,727 \times 0.5)} \times 949.56 = 940.12.$$

$$\text{Surviving 3rd year: } \frac{267,100 - (1,258 \times 0.5)}{267,100 + (1,258 \times 0.5)} \times 940.12 = 935.70.$$

$$\text{Surviving 4th year: } \frac{272,800 - (882 \times 0.5)}{272,800 + (882 \times 0.5)} \times 935.70 = 932.68.$$

¹ See formula (1), page 141.

² Since part of the births registered in 1936 occurred in 1935, the number of surviving infants has been computed by simply relating the deaths of infants registered in 1936 to the number of births registered in the same year.

If the population or the deaths are available only by quinquennial age groups the survivors may be computed by using either of the two following formulas :

$$l_{10} = \left(\frac{F_{5-9} - \frac{1}{2}D_{5-9}}{F_{5-9} + \frac{1}{2}D_{5-9}} \right)^5 \times l_5 \quad (11)$$

$$\text{or } l_{10} = \frac{F_{5-9} - 2\frac{1}{2}D_{5-9}}{F_{5-9} + 2\frac{1}{2}D_{5-9}} \times l_5 \quad (12)$$

Formula (11) yields the same results as the correct formula (1) if the probability of surviving is the same for each year of age within the quinquennial age group, i.e. if

$$\frac{F_5 - \frac{1}{2}D_5}{F_5 + \frac{1}{2}D_5} = \frac{F_6 - \frac{1}{2}D_6}{F_6 + \frac{1}{2}D_6} = \text{etc.}$$

Formula (12) yields the same result as formula (1) if

- (1) $D_5 = D_6 = D_7 = D_8 = D_9$ and
 (2) either $F_5 - F_6 = D_5$, $F_6 - F_7 = D_5$, etc.¹
 or $l_5 - l_6 = l_6 - l_7$, etc.

Formula (11) always yields a greater proportion of survivors than formula (12),² but the difference is negligible, except for age groups where mortality is extremely high. The differences between the results obtained by the two formulas may perhaps best be illustrated by a few examples :

Years of Age	A		B		C		D	
	Mean Population	Deaths	Mean Population	Deaths	Mean Population	Deaths	Mean Population	Deaths
<i>n</i>	1,000	50	1,000	200	1,000	50	1,000	150
<i>n</i> + 1	400	20	400	80	950	50	850	150
<i>n</i> + 2	200	10	200	40	900	50	700	150
<i>n</i> + 3	160	8	160	32	850	50	550	150
<i>n</i> + 4	120	6	120	24	800	50	400	150

In case A the probability of surviving is the same for each year of age. Formulas (1) and (11) both yield the same proportion of survivors at the end of the quinquennial age group, namely $\left(\frac{9}{11}\right)^5 = 778.76$, while formula (12) yields $\frac{7}{8} = 777.78$. The difference is small because mortality, while being high, is not excessive.

¹ It may be noted that page 150, line 9, should read : "(3) either $f_{20} - f_{21} = m_{20}$, $f_{21} - f_{22} = m_{20}$, etc."

² See page 150, footnote 2.

In case B the probability of surviving is likewise the same for each year of age. Formulas (I) and (II) both yield $(\frac{9}{11})^5 = 366.65$ survivors, formula (12) only $\frac{1}{3} = 333.33$. The difference is great because mortality is excessive.

In case C the number of deaths is the same for each year of age and the difference between the mean population at two consecutive years of age is equal to the number of deaths. Formulas (I) and (12) both yield the same proportion of survivors at the end of the quinquennial age group, namely, $\frac{31}{37} = 756.10$, while formula (II) yields $(\frac{35}{37})^5 = 757.41$. The difference is small because mortality, while being high, is not excessive.

In case D the same conditions are fulfilled as in case C. Formulas (I) and (12) both yield $\frac{13}{15} = 302.33$ survivors, formula (II) $(\frac{25}{31})^5 = 341.11$. The difference is great because mortality is excessive.

Practical experiences do not afford any evidence that one formula is better than the other. There is no risk in using either of them unless mortality in the age group under consideration is excessive. Even then formula (II) or formula (12) may lead to absolutely correct results as exemplified by cases B and D. But it is possible that each may yield results wide of the mark. It, therefore, seems advisable rather to interpolate the figures for the mean population and the deaths in the highest age groups (in England and Wales for the age groups over 90 years) and to apply formula (I) to these interpolated figures.¹

The computation of a life table is then a very simple matter, and it may seem surprising that most statistical offices publish life tables only at great intervals. The last three official life tables for England and Wales thus cover the years 1910-12, 1920-22, and 1930-32 respectively. Our information on mortality in this country, as far as it is derived from official life tables, is therefore very scanty for the last twenty-five years. The explanation for the scarcity of official life tables is that they are usually computed by actuaries who (1) are anxious to apply most refined methods to the correction of the original data (a task which may require as many months as the simple

¹ It should be noted that if the annual probability of dying reaches one-third, formula (12) becomes entirely useless. If in case B the number of deaths were doubled, formulas (1) and (11) would yield $(\frac{1}{3})^5 = 131.69$ survivors, while formula (12) would yield

$$\frac{1880 - (752 \times 2.5)}{1880 + (752 \times 2.5)} = \frac{0}{3760} = 0 \text{ survivors.}$$

computation described above requires hours), and (2) have a prejudice against population figures which are not obtained through censuses. But a comparison of official life tables with those computed by the simple method for the same periods shows that, for demographic purposes, the differences are negligible.¹ Even statistical offices which are convinced that the methods of the actuaries, though they vary considerably from country to country, lead always to more accurate results than the simple method should therefore use the simple method for the computation of life tables for the years for which no actuaries' life tables are available. As to the objection that life tables should not be computed on the basis of other than census figures, the answer is very simple. Most statistical offices publish year-in year-out specific age death rates (and some even standardized death rates). If they consider the population estimates at their disposal adequate for this purpose they are adequate also for computing a life table. In each case the necessary basic data are not more and not less than the population and the deaths by age. The Registrar-General's *Statistical Review of England and Wales* shows each year the estimated mid-year population by sex and age (0, 1, 2, 3, 4, 5-9, 10-14, etc., years) and the deaths by sex and years of age. If these figures are fairly accurate the resulting life table will be fairly accurate.²

¹ In appraising the comparative value of a refined and the simple method account should also be taken of the actual degree of accuracy which may be obtained by applying the more refined method. In countries, such as England and Wales, where the official life tables are based on the numbers of births and deaths registered in the period under consideration and are computed on the assumption that, for example, mortality under three months is evenly distributed over the first quarter of life, or in countries, such as the United States, where both the birth and the death records are incomplete, there is no point in applying any other but the simple method.

Where the necessary basic data are available the simple method, of course, may be used also in computing separate life tables for specific groups, such as spinsters (see formula 2, page 141). In case immigration or emigration is considerable, account should be taken of these movements, the excess of emigration over immigration being treated in a life table for all males or females in the same manner as the marriages in a life table for spinsters.

² It may be mentioned incidentally that from a theoretical standpoint there is not even an objection to computing a life table directly from the ordinary age death rates. These

rates show the force of mortality, i.e. $\frac{D_n}{F_n}$, and it is very easy, of course, to derive therefrom the probability of dying (q_n) i.e. $\frac{D_n}{F_n + \frac{1}{2}D_n}$, and the probability of surviving (p_n)

i.e. $\frac{F_n - \frac{1}{2}D_n}{F_n + \frac{1}{2}D_n}$. (If the force of mortality at age n is $\frac{20}{1,000}$, the probability of dying is $\frac{20}{1,010}$,

and the probability of surviving is $\frac{990}{1,010}$.) But in practice such a life table would be rather inaccurate unless the force of mortality is shown with two decimals.

A life table provides the basis for computing the mean expectation of life at various ages. The procedure has been explained in the discussion of nuptiality. According to the 1936 life table for females in England and Wales 94,956 out of 100,000 newly born girls survived the first year of age, and 94,012 the second year. Assuming that the mean age at death of those who died in the second year of life was $1\frac{1}{2}$ years, the 94,956 girls surviving the first year of life would live $\frac{1}{2}(94,956 + 94,012) = 94,484$ years between one and two. The number of girls who survived the third year of age is 93,570. Assuming that the mean age at death of those who died in the third year of life was $2\frac{1}{2}$ years, the 94,012 girls surviving the second year of life would live $\frac{1}{2}(94,012 + 93,570) = 93,791$ years between two and three; and so on. It will thus be found that the mean expectation of life of those surviving the first year of life is

$$\frac{94,484 + 93,791 + \dots}{94,956} = 63.425 \text{ years, that the mean ex-}$$

pectation of life of those surviving the second year of life is

$$\frac{93,791 + \dots}{94,012} = 62.480 \text{ years, and so on. The assumption}$$

that those who die between the ages of n and $n+1$ years will on the day of their death average $n + \frac{1}{2}$ years is arbitrary, of course, but the error involved will, on the whole, be negligible. This assumption, however, is not permissible for the first year of age since, for example in England and Wales, the majority of the deaths under one occur in the first month. It would be wrong, then, to say that, according to mortality in England and Wales, 1936, 100,000 newly born girls live $\frac{1}{2}(100,000 + 94,956) = 97,478$ years in the first year of life. By subdividing the first year into shorter periods¹ it will be found that the mean number of years lived under the age of one is only 96,105 years. The mean expectation of life at birth would then appear to be

$$\frac{96,105 + 94,484 + 93,791 + \dots}{100,000} = 64.386 \text{ years.}$$

In many official life tables, for example those for England and Wales, the mean expectation of life at birth is computed on the wrong assumption that the average age at death of those dying under one is $\frac{1}{2}$ year. The error is

¹ First day, second day, etc., second week, third week, fourth week, four weeks to three months, second quarter, third quarter, fourth quarter.

small, of course, if infant mortality is low, but is not negligible if infant mortality is high. A more serious mistake, which is to be found in some official life table publications, consists in computing the mean expectation of life at birth by adding up the number of survivors at the various years of age. Such a computation, in the case of the females in England and Wales, 1936, would show a mean expectation of life of $\frac{100,000 + 94,956 + 94,012 + \dots}{100,000} = 64.90$ years.

Incredible as it may sound, it even occurs that in official life table publications the mean expectation of life is considered as identical with the probable length of life. The probable length of life of the newly born is found by ascertaining from the life table at which year of age the original stock of 100,000 will be reduced to 50,000. The Hungarian Statistical Office thus ascertained that according to the life tables for Hungary, 1930-31, one-half of the newly born boys would have died at 59.77 years and one-half of the newly born girls at 63.74 years. It then compared these figures with the mean expectation of life ascertained for other countries and concluded that the probable length of life in Hungary was greater than in most countries of western civilisation.¹ As a matter of fact the mean expectation of life in Hungary, according to the life tables of 1930-31, was only 48.24 years for males and 51.32 years for females.

The mean expectation of life at birth is usually given for males and for females, but not for the total population, and there seems to be a widespread belief that in order to ascertain the mean expectation of life at birth for the total population it would be necessary to compute a separate life table for the total population. There exists, however, a very simple device for deriving the mean expectation of life at birth for the total population directly from the life tables for males and females. The procedure consists in multiplying the mean expectation of life of the males by the proportion of male births and the mean expectation of life of the females by the proportion of female births and adding the products. In England and Wales, 1936, the mean expectation of life at birth was 60.131 years for males and 64.386 years for females. The male births numbered 310,605 and the female births 294,687. Of 100,000

¹ See *Revue hongroise de statistique* 1937, pp. 732-733; see also *ibid.*, 1930, pp. 173-175 (French translation, *Journal de la Société Hongroise de Statistique*, 1930, pp. 87-89).

newly-born children 51,315 were boys and 48,685 girls. The mean expectation of life at birth of the total population was then $(60.131 \times 0.51315) + (64.386 \times 0.48685) = 62.20$ years.

If the mean expectation of life at birth is constantly 62.20 years, $\frac{1}{62.20}$ or 16.08 per 1,000 die every year, and 16.08 would then be the death rate derived from the life table. It eliminates all the misleading effects of the actual age and sex composition of the population which is the result of changing fertility and mortality, and of emigration and immigration stretching over a past period of nearly a hundred years. The death rate derived from the life table, which is also called the death rate of the stationary population, is then a perfect gauge of current mortality.

The computation of this correct death rate is absolutely indispensable in order to obtain a true picture of the trend of mortality. For half a century the crude death rate of England and Wales decreased much more rapidly than did mortality because during this period the changes in the age composition of the population tended to reduce the number of deaths. In the last fifteen years the crude death rate has remained almost stationary in spite of a decline of mortality because the changes in the age composition tended to swell the number of deaths. For half a century the Registrar-General's standardized death rates¹ followed roughly the same rapid downward trend as the crude death rates, and they continued to decline in the last fifteen years more rapidly than did mortality because, contrary to the crude death rates, they are not affected by the ageing of the population. Table X shows the trend of the various death rates.

From 1871-80 to 1920-22 the crude and the standardized death rates differed very little from each other, the former decreasing by 39 per cent., the latter by 43 per cent. But from 1920-22 to 1936 the crude death rate decreased by only 2 per cent., while the standardized death rate decreased by 21 per cent. The death rate of the stationary population, on the other hand, decreased from 1871-80 to 1920-22 by only 25 per cent., and from 1920-22 to 1936 by 7 per cent. For many decades the curve of the crude death rates

¹ "The standardized rates . . . are the rates which would result if each sex and age group of the census population in 1901 was subject to the death-rate at that age during the year to which the rate applies" (*Statistical Review of England and Wales for the Year 1935*, Text, pp. 1-2).

TABLE X.
CRUDE, STANDARDIZED, AND STATIONARY DEATH RATES,
ENGLAND AND WALES, 1871-1936.

Years	Crude	Standardized ¹	Stationary ²	Crude	Standardized	Stationary
				(1901 = 100)		
1871-1880 ..	20.49	20.3	23.28	121.1	120	110.9
1881-1890 ..	18.73	18.6	22.03	110.7	110	104.9
1891-1900 ..	18.19	18.1	21.78	107.5	107	103.7
1901-1910 ..	15.36	15.2	19.83	90.8	90	94.4
1910-1912 ..	13.77	13.4	18.73	81.4	79	89.2
1920-1922 ..	12.42	11.6	17.38	73.4	69	82.8
1930-1932 ..	11.93	9.8	16.48	70.5	58	78.5
1921 ..	12.09	11.3	17.22	71.5	67	82.0
1922 ..	12.74	11.6	17.45	75.3	69	83.1
1923 ..	11.57	10.2	16.79	68.4	60	80.0
1924 ..	12.20	10.7	17.11	72.1	63	81.5
1925 ..	12.14	10.6	17.07	71.8	63	81.3
1926 ..	11.60	10.0	16.72	68.6	59	79.6
1927 ..	12.34	10.5	16.95	72.9	62	80.7
1928 ..	11.66	9.9	16.59	68.9	59	79.0
1929 ..	13.45	11.4	17.34	79.5	67	82.6
1930 ..	11.44	9.5	16.36	67.7	56	77.9
1931 ..	12.29	10.1	16.63	72.7	60	79.2
1932 ..	12.04	9.7	16.43	71.2	57	78.2
1933 ..	12.30	9.8	16.45	72.7	58	78.3
1934 ..	11.78	9.3	16.18	69.7	55	77.0
1935 ..	11.75	9.0	16.02	69.4	53	76.3
1936 ..	12.14	9.2	16.08	71.8	54	76.6

conveyed a grossly exaggerated picture of the reduction of mortality; for recent years, it makes the reduction appear much smaller than it actually was. For many decades the curve of the standardized death rates, which the Chief Medical Officer of the Ministry of Health considers to be the "ultimate criteria of sanitary success",³ exaggerated the decline of mortality as much as the crude death rates; it also considerably overstates the reduction for recent years. Putting the rates for the year 1901 equal to 100, the crude death rate in 1936 appears to be 72, the standardized death rate 54, and the stationary death rate 77. The standardized death rate is, then, a still less adequate gauge for the measurement of mortality than the crude death rate.⁴

¹ See *Statistical Review of England and Wales*, 1936, Part I, p. 6.

² For 1871-80 to 1930-32 from Official Life Tables, for 1921-1936 from Life Tables constructed by Mr. David Glass.

³ See *Annual Report*, 1936, p. 1.

⁴ The relative importance of the various causes of death can be derived also more accurately from the crude than from the standardized death rates. The best method, however, is to subdivide the deaths by age derived from the life table according to causes of deaths. (See *The Measurement of Population Growth*, pp. 194-195.) The intrinsic fallacy of the standardized death rates becomes at once obvious if one realises that "to compute a standardized death rate for 1936 on the assumption that the age composition has not changed since 1901 is just as futile as to compute a cost of living index on the assumption that the worker buys the same amount of each commodity in 1936 as he did in 1901" (*The Statist*, January 15th, 1938, p. 79).

Net Reproduction

The method usually employed in official statistics for measuring the balance of births and deaths consists in deducting the death rate from the birth rate. But this computation does not take account of the age composition, and if, as was the case until recently in all countries of western civilisation, the age composition tends to swell the birth rate and to reduce the death rate, the error is bound to be cumulative. In order to establish a correct balance of births and deaths it is necessary to combine the best devices of measuring fertility and mortality. With this purpose in view, Richard Böckh in 1884 calculated a fertility table.¹ He took the life table of the city of Berlin for 1879, multiplied the number of females for each year of age by the fertility rate for that year of age in 1879, and added the products. The sum, 2,172, gave him the number of births to 1,000 females on the basis of the fertility and mortality of 1879. Since according to the distribution of the sexes at birth there were 1,053 male births per 1,000 female births, he concluded that the real natural increase of the Berlin population in 1879 was $\frac{2172}{2053} - 1 = 6$ per cent.

Böckh had thus virtually discovered what we call to-day the *net reproduction rate*. This rate indicates by what percentage a population constantly subject to a certain fertility and a certain mortality will ultimately increase or decrease within a generation. The net reproduction rate of Berlin for 1879 was 1.06. This means that on the basis of fertility and mortality of 1879 the average number of girls born to a newly born girl, or, what amounts to the same, the average number of future mothers born to a mother of 1879 was 1.06.

The procedure to be followed in computing the net reproduction rate (if separate data are available for female births) is shown in Table VIII for Australia, 1920-22. Let us take as an example the age of 24 years. The yearly number of female births per 1,000 females is 80 (see col. 5). If out of 1,000 newly born females none died before the age of 25, they would at the age of 24 bear 80 girls. But since out of 1,000 newly born females only 888 are found to be living at the age of 24 (see col. 12)—or to put it otherwise: since,

¹ See *Statistisches Jahrbuch der Stadt Berlin*, 1884, pp. 30-34.

according to the life table, 1,000 newly born females do not live 1,000 years, but 888 years between the age of 24 and 25 years—1,000 newly born females, at the age of 24, bear 71 girls only. The sum of the net rates of the individual years is 1,318.5 (see col. 13). While 1,000 women passing through child-bearing age would, according to the fertility of 1920-22, give birth to 1,517 girls, 1,000 newly born girls would, according to the fertility and mortality of 1920-22, give birth to 1,319 girls. A thousand mothers would thus give birth to 1,319 future mothers; and 1.319 would represent the net reproduction rate.

In order to compute the gross reproduction rate for a given period it is necessary to know the mean number of females by age and the (female) births by the age of the mothers. In order to compute the net reproduction rate it is necessary to have in addition a life table for the same period. But up-to-date official life tables are seldom available. With the growing demand for net reproduction rates several statistical offices have started, therefore, to compute such rates by applying the last official life table to the fertility rates of more recent years. The net reproduction rates thus obtained are obviously far too low if, what is often the case, mortality of females up to 50 years has decreased considerably since the period covered by the life table. Let us assume that the gross reproduction rate in 1921-30 was 1.6 and the net reproduction rate (according to the mortality in this decade) 1.2. If then the gross reproduction rate had decreased to 1.2 in 1936, the net reproduction rate computed on the basis of the life table of 1921-30 would appear to be 0.9. But if it so happened that mortality in 1936 was much lower than in 1921-30, it may well be that the correct net reproduction rate for 1936 was still above unity. Since the computation of a life table for the females up to 50 years (even if carried out for single years) does not take more than a few hours there is no excuse for a statistical office computing a net reproduction rate on the basis of an out-of-date life table.

The net reproduction rate indicates by what percentage a population constantly subject to a certain fertility and a certain mortality will ultimately increase or decrease within a *generation*. But the length of the generation is not the same everywhere; moreover, in analyzing vital statistics we are accustomed to count in years and not in

generations. It is the great merit of Lotka to have discovered a device for deriving from the net reproduction rate the rate (r) at which a population constantly subject to a certain fertility and a certain mortality will ultimately increase or decrease within a *year*.¹ The procedure for computing this rate may be briefly explained as follows:

If R_0 = net reproduction rate

R_1 = sum of terms constituting R_0 each multiplied by years of age at confinement²

R_2 = sum of terms constituting R_1 each multiplied by years of age at confinement³

etc.

$$R_0 - rR_1 + \frac{r^2}{2} R_2 - \frac{r^3}{6} R_3 + \frac{r^4}{24} R_4 - \dots = 1 \quad (13)$$

An approximate value of r can then be found by the following formula:

$$r = \sqrt[\frac{R_1}{R_0}]{R_0 - 1} \quad (14)$$

The value thus obtained understates the rate of increase and overstates the rate of decrease. But the error is negligible if r is very small, i.e. if the net reproduction rate is around unity, and even if r amounts to ± 25 per 1,000 (net reproduction rate about 2 or about 0.5) the error is not likely to exceed ± 1 per cent.

A much closer approximation can be found by the following formula:

$$r = \frac{\frac{R_1}{R_0} - \sqrt{\left(\frac{R_1}{R_0}\right)^2 - 2 \left[\frac{R_2}{R_0} - \left(\frac{R_1}{R_0}\right)^2 \right] \log e R_0}}{\frac{R_2}{R_0} - \left(\frac{R_1}{R_0}\right)^2} \quad (15)$$

For values of r such as occur in practice formula (15) will always yield entirely satisfactory results.⁴ In order

¹ See Louis I. Dublin and Alfred J. Lotka, "On the True Rate of Natural Increase as Exemplified by the Population of the United States, 1920," *Journal of the American Statistical Association*, 1925, Vol. XX, pp. 305-339.

² In the case of Australia, 1920-22 $(0.05 \times 13.5) + (0.22 \times 14.5) + \dots$

³ In the case of Australia, 1920-22 $(0.05 \times 13.5 \times 13.5) + (0.22 \times 14.5 \times 14.5) + \dots$

⁴ It should be noted, however, that this is not necessarily true for hypothetical cases. Let us assume that mortality in England and Wales would be constantly what it was in 1933, but that fertility would be constantly such that every female from 17 to 46 years would have a child every eighteen months. The population would then ultimately increase each year

by 73.7 per 1,000. In order to find this rate terms of higher than the second degree in $\frac{R_1}{R_0}$ are indispensable.

to reduce the amount of computation it has been applied so far, as a rule, to quinquennial age groups. This in itself is not objectionable. But in computing R_1 and R_2 , the multipliers usually are not chosen judiciously. It is customary to select as pivotal ages 17.5, 22.5, etc., years. It is thus assumed that the mean age at confinement of the mothers between 15 and 20 is 17.5 years. This assumption, however, is utterly wrong. Assuming that in Australia 1920-22 the mean age of the mothers between 15 and 16 was 15.5 years, that the mean age of the mothers between 16 and 17 was 16.5 years, and so on, then the mean age at confinement of the mothers between 15 and 19 would have been 18.8, and not 17.5 years. In fact, the mean age probably was higher still than 18.8 years because the mean age of the mothers delivered between 15 and 16 was doubtless higher than 15.5 years, the mean age of those delivered between 16 and 17 higher than 16.5 years, and so on. In deriving the yearly rate of increase or decrease from a net reproduction rate based on quinquennial age groups great care should, then, be taken in estimating the mean age at confinement within these groups.

Conflicts of Principle in Wage Regulation in New Zealand

By E. J. RICHES

I

FOR more than forty years, save for the period 1932-1936, minimum wages throughout a large part of New Zealand industry have been determined by judicial regulation. Under the provisions of the Industrial Conciliation and Arbitration Act disputes involving registered unions of workers, if not disposed of by conciliation, must be referred to the Court of Arbitration for final settlement and the Court's position as final arbiter has made it in effect a wage-fixing authority.

During most of this time the Court has had no statutory guidance, and has been subject to no restriction, as to the considerations it should take into account or the principles it should follow in regulating wages. A permanent tribunal responsible for maintaining industrial peace must, however, be reasonably consistent in its decisions. If no rules are prescribed, it must invent them; and it must follow its own precedents. Any other course would lead to chaos and would defeat the very purpose for which it is established. At first, it is true, the distinguished lawyers who succeeded one another as judges of the New Zealand Arbitration Court were naturally hesitant, since legal principle and economic theory alike gave little guidance, to lay down rules which must be binding in subsequent decisions. But it was not long before they felt it incumbent on them to give some explanation of the reasons for their awards, and from successive explanations it is possible to trace the gradual development of a more or less coherent system of wage principles. The policy adopted may be broadly summarised as an attempt to fix minimum rates of wages that would be uniform within each single grade of work, appropriately differentiated for work of different grades,

adequate to provide a living wage, within the capacity of industry to pay, fair as compared with the shares of total product received by other factors of production, and stable over fairly long periods.¹

In a large proportion of its decisions the Court has been able fairly consistently to apply these principles. There is, however, an inevitable tendency for the conclusions suggested by such criteria as the capacity of industry to pay and the living wage to be at variance, and in many cases the Court's explanations show that it was forced to choose between conflicting principles. Cases of this kind, which form the subject of the present paper, throw light both on the types of problem encountered by all wage-fixing authorities and on the relative importance attached by the New Zealand Court to different criteria. The conflicts of principle revealed by the Court's explanations may be classified in two groups: first, those which affected primarily the relative rates of wages in different trades and industries, and second, those which concerned mainly the absolute level of wages in general. In the following pages the two groups are dealt with in that order.

II

In considering what relation the minimum rates of wages in any particular trade or industry should bear to those in force elsewhere the Court has been guided mainly by what may be termed the principles of uniformity and fair margins. Uniformity of minimum rates within each single grade of work was sought as a means of eliminating unfair competition, standardising the remuneration for tasks requiring equally scarce abilities, and removing a possible cause of industrial unrest.² In distinguishing the different grades of work and in fixing appropriate margins regard is had primarily to the degree of skill, care and responsibility required.³ The two principles taken together form the

¹ This summary is based mainly on a detailed analysis of all decisions given by the Court up to and including 1937. The decisions are to be found in the annual volumes of *Awards, Recommendations, Agreements, Orders, etc., made under the Industrial Conciliation and Arbitration Act, the Apprentices Act, and the Labour Disputes Investigation Act* (subsequently referred to as *Awards*), published by the New Zealand Department of Labour. For the results of a somewhat similar analysis covering the period up to 1924, see E. M. Burns: *Wages and the State: a Comparative Study of the Problems of State Wage Regulation* (London, 1926).

² Cf. E. J. Riches: "The fair wage principle in New Zealand: its application and a possible extension", in *Economic Record*, Vol. XIII, No. 25, December, 1937, pp. 224-239.

³ There are also various special differentials and allowances—e.g., for work which is particularly arduous, dangerous or disagreeable; and within each grade higher rates are fixed for casual than for permanent work.

basis of a system of standard minimum rates for three main grades of work—skilled, semi-skilled and unskilled.

To establish uniformity within these grades it is necessary to disregard variations in the capacity to pay of particular industries. Thus in a case involving saddlers and harness and collar makers the Court held that the fact that their trade was “in a languishing condition” was no sound reason for not placing them “on something like a footing of equality with those working in other skilled trades”¹; and at a time when the engineering trade was slack an application for a general reduction of wages was refused on the ground that it was “inadvisable to reduce the rates of remuneration of engineers below the standard rates for skilled workers”.² Again in 1930 the fact that a severe depression had developed since the last occasion on which the standard minimum rates had been revised was held to be no reason for not bringing the rates in new awards up to the levels already in force elsewhere. “The Court, after having fixed a standard, must apply that standard, until it decides to alter it”.³ A general reduction, it was hinted, might prove necessary but the principle of standard minima within each grade of skill must be maintained.⁴

Conflicts between the rule of uniformity and the capacity to pay of a particular industry have not always, however, been decided in favour of the former. During the early years of the Court there were a number of exceptions. Thus in an early dispute in the gold-mining industry the Court fixed rates of wages lower than those paid by the same industry for the same grades of work in other districts, on the ground that in the district concerned the industry was “in a languishing and depressed condition.” “This Court,” it observed, “is not, in our opinion, justified in so increasing the rate of wages as to destroy, or in a great measure cripple, an industry upon which so many workers now depend for their livelihood, and in which so many individuals have invested their money”.⁵ Saddlers and harness and collar makers, whose trade was declining,

¹ Wellington District saddlers', collar makers', harness makers' and bag makers' award, 6th June, 1916: *Awards*, Vol. XVII, at p. 489 (Stringer, J.).

² Canterbury engineers' award, 14th December, 1922: *Awards*, Vol. XXIII, at p. 1282 (Frazer, J.).

³ (Auckland) electrical workers' (Electric-power Boards, etc.) award, 17th December, 1930: *Awards*, Vol. XXX, at p. 987 (Frazer, J.). Cf. p. 1013.

⁴ Cf. *Awards*, Vol. XXX, p. 1036.

⁵ Thames gold miners' award, 4th October, 1901: *Awards*, Vol. III, at p. 24 (Cooper, J.).

were at one time awarded a wage less than that fixed for workers of comparable skill for the reason that "the conditions of the trade have rendered a low minimum necessary".¹ Boot operatives also were awarded less than the standard rate for skilled workers because of "the conditions affecting the industry, and particularly the competition which it has to maintain with imported articles".² On one occasion bakers were awarded a smaller increase than other skilled workers "in view of the facts" (*inter alia*) "that the price of bread has been fixed by the Board of Trade and cannot therefore in the meantime be increased, and that the master bakers have had to meet increased expenses which cannot be passed on to the public".³ Even in recent years, when the principle of uniformity was firmly established, and capacity to pay was generally considered in terms of the country as a whole, the Court has occasionally fixed rates below the standard minima for workers in depressed industries. An outstanding case occurred in 1930 when a sharp fall in the price of flax fibre led to the closing down of all the flax-mills in a certain district. As a result some hundreds of men were thrown out of work at a time when unemployment was widespread. In order to enable the mills to reopen the Court granted an application by the employers for a 33½ per cent. reduction in the award rates, although this meant that the wages of minimum grade workers would be reduced well below the current standard minimum rate.⁴ The gold-mining industry, with its special problems, provided another example. "For a considerable number of years, due to the price of gold being standardised, mine workers did not receive the increase of wages received by workers in other industries."⁵

¹ Canterbury saddlers', harness and collar makers' award, 12th July, 1909: *Awards*, Vol. X, at p. 357 (Sim, J.). Under a later judge, however, the Court rejected this argument, cf. p. 318 above.

² (Dominion) male boot operatives' award, 19th May, 1916: *Awards*, Vol. XVII, at p. 456 (Stringer, J.). Cf. Vols. XIII, p. 182 (woollen-mills) and XVI, pp. 300 (engineering trade) and 431 (flax-mills).

³ Order amending the (Auckland) bakers' and pastry-cooks' award, 28th June, 1919: *Awards*, Vol. XX, at p. 615 (Stringer, J.).

⁴ Order amending the Wellington Industrial District flax-mills employees' award, 23rd December, 1930: *Awards*, Vol. XXX at pp. 1010-1014 (Frazer, J.).

⁵ Blackwater gold miners' award, 25th November, 1936: *Awards*, Vol. XXXVI, at p. 1081 (Page, J.). During the recent depression, however, the New Zealand currency depreciated substantially in terms of gold and in 1936 the Arbitration Court, noting that the price of gold "for a substantial time has maintained a figure over 60 per cent. above its former standard price" concluded that "an increase in wages, bringing them into the position previously held by them in relation to other industries," was justified (*Ibid.*). Cf. also p. 328 below.

As the Court was opposed to anything in the nature of profit-sharing¹ the fact that a particular industry was enjoying unusual prosperity was not considered a reason for awarding rates above the standard minima. Conflicts between the principles of uniformity and capacity to pay, of a kind opposite to those just noted, were accordingly ruled out. Even when, as in 1931, the Court was specially empowered to exclude any class or section of workers from a general order reducing or increasing wages, if it considered that the economic and financial conditions affecting any trade or industry rendered such exclusion just and equitable,² it held that workers in a prosperous industry should not, if their wages were in accordance with current standards, be granted exemption from a general reduction. "To do so," it explained, "would have the effect of placing the workers concerned on a standard relatively higher than that of workers performing somewhat similar work in other occupations".³

The principle of fair margins, like that of uniformity, came into conflict at times with the principle of capacity to pay, which sets an upper limit to the range of differential wage rates. Since a lower limit to this range is set, as will be seen in the next section of this paper, by the Court's principle of the living wage, the conflict involved the latter principle as well. When for any reason the range between these limits was reduced, margins were bound to suffer.

Reference has been made already to certain cases in which the limited capacity to pay of a particular industry was accepted as a reason for fixing the minimum rates for skilled workers in that industry at a level below the standard minimum for workers in their grade. Of greater importance were those cases in which a conflict between the principle of fair margins and the principle of capacity to pay, interpreted in terms of industry as a whole, affected the general margins between the standard minima. The clearest illustration

¹ Cf. *Awards*, Vols. VII, p. 60; XXVIII, p. 811; and XXXI, pp. 236 and 350-352. For an exception to this attitude see Vol. XVII, p. 970 and cf. Vol. XVI, p. 29.

² Under the provisions of the Finance Act, 1931, section 18 (1), which expired at the end of 1932.

³ Judgment refusing an application by oil-stores employees for exemption from the general order of 29th May, 1931, reducing wage rates, 12th November, 1931: *Awards*, Vol. XXXI, at p. 351 (Frazer, J.). The Court held, however, that "the economic and financial conditions affecting a trade or industry may be considered as a ground for withholding an increase, fixed by general order, if it can be shown that the trade or industry concerned is specially affected by slackness of business or similar circumstances" (*Ibid.*).

of such a conflict is provided by the movements of wage rates during the war and early post-war periods. When war conditions led to a sharp rise in the cost of living, the Court realised that the principle of the living wage, to which it had come to attach some importance, required an increase in the wages of the lowest paid workers. It was, however, convinced that industry could not afford an all-round wage increase sufficient to offset the rise in cost of living. It decided accordingly to grant an increase to the lowest paid workers and a smaller increase, or none at all, to those who were more highly paid.¹ Absolute margins were thus reduced and relative margins were reduced still more. At a later stage a flat-rate cost of living bonus was awarded (as an addition to standard basic rates for the main grades of work) and the amount of the bonus was adjusted from time to time.² Under this system also relative margins were reduced as prices rose. In May, 1920, the basic rates were raised—the unskilled rate by 1½d. an hour and the skilled rate by 2½d.³ The increase was, however, not sufficient to restore relative margins for skill to the level enjoyed by certain important groups of workers in 1914.⁴ As subsequent adjustments in the standard minimum rates were uniform in amount or in proportion,⁵ the restoration was never made complete. From 1925 on the Court fixed a rate for unskilled workers which it considered adequate to compensate for the full rise in cost of living since 1914, but even in 1929, when the country was relatively prosperous and money wage rates had practically reached their pre-depression peak, it felt unable to do the same for semi-skilled or unskilled workers. The unskilled worker, it pointed out, was “less able than anyone else to meet the increased cost of the necessities of life,” while the semi-skilled and skilled workers “were usually paid more than the award

¹ See *Awards*, Vols. XVI, pp. 337, 431, 487 and 700; XVII, pp. 418 and 960; and XVIII, pp. 70-71; and cf. Vols. XIII, p. 182; XV, p. 245; XX, p. 353; XXVII, pp. 151-152; and XXIX, pp. 234-235.

² *Awards*, Vols. XXIII, pp. 334 ff. (history of the bonus up to May, 1922), and 964 ff.; and XXIV, pp. 179 ff. Cf. also Vol. XIX, pp. 1061-2.

³ *Awards*, Vol. XXI, pp. 513-514.

⁴ E.g., carpenters and joiners, whose rate was 28.6 per cent. above the builders' labourers' rate in 1914 (cf. *Awards*, Vols. XIV, pp. 641, 810 and 1065 and XV, pp. 140, 264, 393, 674, 788 and 920), as compared with the margin of 22.7 per cent. between the standard skilled and unskilled rates of May, 1920.

⁵ With one exception: in September, 1937, the skilled rate was actually increased by a smaller amount than the unskilled rate (cf. *Awards*, Vol. XXXVII, pp. 1648 and 1656). As compared with the standard minima adopted by the Court from 1925 to 1931 (and restored by the Finance Act, 1936, for the period from 1st July, 1936, until the forty-hour week came into operation) the increase was, however, uniform.

rates".¹ In 1937, although it considered "that it should maintain the ratio as between skilled and unskilled rates observed in its previous pronouncements," the Court actually fixed each of the standard minima at a figure 6d. an hour above the corresponding rate of 1925.² Relative margins were thus again reduced.

There is one further point which should be noted in this connection. As a general rule the Court has sought to fix the minimum rates of wages at levels which could be maintained even in the face of temporary depression.³ This policy, combined with the principle of a living wage for the lowest paid worker, inevitably meant that the margins separating the skilled, semi-skilled and unskilled minima were kept within rather narrow limits. The main objective was apparently the maximum of stability in award rates; but there may have been another aim as well. Any legal minimum sets a limit to the working of the principle of different wages for jobs requiring different degrees of skill. The higher the level at which the minimum rate for skilled workers is fixed, the smaller will be the range between the highest rate which an employer can afford to pay to his most highly skilled and efficient workers and the rate which must be paid to the least skilled workers in that grade. The more detailed the classification of workers adopted and the greater the number of different minimum rates fixed, the more important this factor will be and the stronger will be the tendency for the rates actually paid to approximate to the minimum rates. The New Zealand Court has, however, limited the operation of this tendency by simplifying as much as possible the classification of workers⁴ and by fixing only three main standard minimum rates.⁵ Moreover, the Court's minimum rates are designed merely to remunerate fairly "the worker who comes up to the minimum requirements for the class of work in which he is engaged" and to leave room for the employer to give "due recognition to workers of greater industry and efficiency".⁶

¹ (Auckland) stonemasons' and monumental workers' award, 17th May, 1929: *Awards*, Vol. XXIX, at pp. 234-235 (Frazer, J.). It may however be noted that in 1922 and again in 1931 the Court recognised that the rates of wages actually paid approximated to the legal minima (*Awards*, Vols. XXIII, pp. 346 and 353 and XXXI, p. 158).

² *Awards*, Vol. XXXVII, p. 1648; and cf. Vol. XXVA, p. 803.

³ Cf. pp. 325-326 below.

⁴ Cf. e.g., *Awards*, Vols. XIII, p. 662, XXIX, p. 237, and XXXVII, p. 2927.

⁵ The rates for skilled, semi-skilled and unskilled workers. The semi-skilled rate is, however, a range of rates (at present from 2s. 5d. to 2s. 7½d. an hour) rather than a single rate.

⁶ Pronouncement of the Court *re* the cost of living and the basic wage, 15th September, 1925: *Awards*, Vol. XXVA at p. 802 (Frazer, J.). Cf. Vols. XXVII, p. 152; XXIX, p. 235 and XXX, p. 1012.

Such statements as these suggest indeed that the Court may have sought deliberately to fix the standard minima for skilled and semi-skilled workers at a relatively low level, in order to leave the greatest possible latitude for variations in actual wage rates corresponding to differences in the skill of individuals or groups of workers or to differences in the capacity to pay of different industries. It may, however, be doubted whether the competition between employers for skilled workers and the mobility and knowledge of employment opportunities possessed by such workers are sufficient in themselves to secure the payment in many cases of individual differentials equivalent to the full variations in individual skill and efficiency, or even the payment to the main body of skilled workers, whose rates of wages at any time are roughly standardised, of wages conforming at all closely to the full value of their average marginal revenue product. If competition and mobility prove insufficient, trade union action can provide no adequate alternative, for with compulsory arbitration and binding awards direct action by the trade unions is ruled out. Consequently, even though the standard rates actually paid may rise in times of relative prosperity above the legal minima, there is no certainty that the rise will be as great as increased productivity and the capacity of industry to pay would warrant. All things considered, it seems probable that, in conditions such as those which exist in New Zealand, the wage-regulating authority must be held largely responsible, within the limits set by demand and supply conditions, for the size of actual as well as legal margins for skill. Particularly will this be the case if, on account of the importance attached to the principle of the living wage, the minimum for unskilled workers is fixed at a level which is relatively high.

III

In determining the general level of award rates, as distinct from the relative rates for different jobs, the Court has looked for guidance to the principles that wages should be within the capacity of industry to pay, adequate to provide a living wage, stable over fairly long periods, and fair as compared with the shares of total product received by non-wage-earners or by factors of production other than labour.

Of the last-mentioned of these principles little need be said. There are occasional references in the Court's decisions which suggest that it has given consideration to the notion of a fair share in the product of industry,¹ but there is no indication that it has formulated or sought to apply any particular criterion of fairness in this connection. Clear-cut conflicts between this and other principles followed by the Court have therefore not arisen.²

Throughout the history of the Court the principle of capacity to pay has played a major part in its decisions. On each occasion when the Legislature has given specific directions as to the factors to be taken into account in fixing wages it has included "the financial and economic conditions affecting trade and industry," or some such reference to capacity to pay; and at other times as well the Court's explanations have contained frequent indications of the importance attached to this criterion. At first there was a tendency to give considerable weight to the capacity to pay of individual industries, but as the number of industries under the Court's jurisdiction increased and the rule of uniformity within each grade of work was gradually extended, the interpretation in terms of particular industries gave way to considerations of the capacity to pay of the country as a whole. With the formal adoption in 1919 of the principle of standard minimum rates for three main grades of work the latter interpretation became definitely established and in recent years only quite exceptional circumstances have been regarded as justifying departures from this rule.

The living wage, on the other hand, was not at first a major consideration. Although various early decisions contained some reference to the cost of living it was not until the second decade of the Court's existence that this factor and the related concept of the living wage came to bulk large in its deliberations. When prices rose sharply as a result of war conditions the principle of the living wage assumed, in the case of low-paid workers, a dominant importance, and in the special legislation of 1918-1923 it

¹ See, for example, *Awards*, Vols. XX, pp. 167-168; XXI, p. 2235; XXIII, p. 968; XXVI, p. 571; XXVII, pp. 155-156; and XXXI, pp. 150 and 155. The present Judge, however, has specifically rejected the contention that "the Court is called upon to measure out to the producers the portion of the national income which is considered to be their due"—one of his reasons being that not all recipients of income come within the Court's jurisdiction (*Awards*, Vol. XXXVII, p. 1649; O'Regan, J.).

² There was, however, at least a suggestion of such a conflict on the occasion of the general reduction of wage rates in 1931 (cf. *Awards*, Vol. XXXI, pp. 150 and 155).

was given statutory recognition. In the succeeding years it continued, though in less degree, to claim the Court's attention and under the law as it stands to-day the cost of living is one of the factors to which the Court must have regard in fixing the generally applicable basic rates of wages.

Stability in the award rates is generally considered desirable in the interests both of employers and of workers. "It is . . .", said Mr. Justice Stringer, who was Judge of the Court from 1914 to 1920, "undesirable that the rates of wages of workers in an industry should be liable to variation at short intervals, as this would necessarily be embarrassing if not unfair to employers, especially in cases where, as frequently happens, they enter into contracts extending over considerable periods and involving the employment of a large number of workers".¹ Mr. Justice (now Sir Francis) Frazer (1921-1935) pointed out in addition that "A reduction in money wages, even if only to an amount necessary to offset an increase granted to meet unusual and temporary conditions, is always misunderstood, and sometimes occasions industrial strife."²

As the capacity of industry to pay is a fluctuating quantity, the principle that minimum rates of wages should remain stable over lengthy periods is apt to come in conflict with the rule that they should not exceed the limit of capacity to pay. To minimise the risk of such conflict and above all to avoid any occasion for reductions in the award rates, the Court seems generally to have sought, when fixing its standard minima, to set them at a level which would be well within the normal capacity of industry to pay and would be capable of being maintained even in the face of temporary slackness of trade. This was the policy in particular of Mr. Justice Frazer during most of his term as judge of the Court. The minimum wage, he held, "should not be so high as to be oppressive to employers in the industry in times of temporary depression, and it should leave a margin sufficient to enable an employer to pay higher rates to his more industrious and deserving workers when trade is moderately prosperous, and to pay higher rates to his

¹ Memorandum on applications under War Legislation and Statute Law Amendment Act, 1918, dated 19th April, 1919: *Awards*, Vol. XX at p. 404. Cf. similar statements by Mr. Justice Frazer in Vols. XXIV, p. 887; XXVA, p. 801; XXVII, p. 154; and XXX, p. 1012.

² Pronouncement of the Court *re* the cost of living and the basic wage, 15th September, 1925: *Awards*, Vol. XXVA, at p. 801. Cf. Vol. XXVII, p. 154.

workers generally in times of trade activity.”¹ There were indeed only three occasions, twice in 1922 and once in 1931, when the Court’s standard minimum rates were reduced, and even then the reductions made were in 1922 no greater and in 1931 only slightly greater than the estimated declines in cost of living.

The policy enunciated was one which would automatically rule out any attempt in times of prosperity to fix the highest rates that industry could bear. The Court indeed claimed on one occasion that the result of its activities during the post-war boom had been “that the checks thereby placed on the operation of individual bargaining and of the law of supply and demand in the labour-market have prevented the violent rises in wages that took place in some trades in other parts of the world.”² There is not space here to examine the full implications of such a policy, but one point, directly relevant to the present discussion, may be briefly noted. To the extent that this policy was actually applied, the Court’s failure in times of prosperity to push wages up to the limit of capacity to pay may have favoured inflationary expansion and thus rendered subsequent depressions somewhat more severe. The importance of this factor would no doubt be small as compared with that of the fluctuations in receipts from exports and in Government expenditure which have been the main causes of economic expansion and contraction in New Zealand. It is, however, a reason for thinking that the Court’s success in reconciling the principles of stability and capacity to pay may have been somewhat smaller in reality than in appearance.

In certain industries, moreover, the degree of stability maintained has been less than in the case of the standard minima. During the depression of 1921–22, when the latter were reduced only to the extent of the estimated

¹ Amendment of Wellington Industrial District flax-mills employees’ award, 23rd December, 1930: *Awards*, Vol. XXX, at p. 1012. Cf. Vols. XXVA, pp. 801–803; XXVII, pp. 151–152, and XXIX, p. 235.

The policy adopted by Mr. Justice Stringer (1914–1920) was in effect similar, since he allowed minimum rates of wages to lag appreciably behind rising costs of living in spite of the fact that industry was unusually prosperous (cf. *Awards*, Vols. XX, pp. 167 and 405; XXI, p. 2235; and XXIII, pp. 335 and 339; and J. B. Condliffe: “Experiments in State Control in New Zealand,” in *International Labour Review*, Vol. IX, No. 3, March, 1924, p. 340).

The present Judge, however, appears to have adopted a different policy (see, for example, the rates of wages fixed and the reasons given in his standard rates Pronouncement of 7th September, 1937: *Awards*, Vol. XXXVII, pp. 1648 and following).

² Further Pronouncement of the Court *re* cost of living for period October, 1921–March, 1922, 8th May, 1922: *Awards*, Vol. XXIII at p. 346 (Frazer, J.).

decline in cost of living, a sharp fall in the prices of wool, skins and mutton led to a considerably greater reduction in the rates fixed for shearers and shearing shed hands.¹ And in 1930, when the standard minima were still kept at the level reached in 1925, award rates in the flax-milling industry were cut $33\frac{1}{3}$ per cent.² In the case of shearers and shearing shed hands minimum wages have been fixed during most of the time since 1928 by sliding scale agreements (converted into awards) and the Court has thus been relieved of the responsibility for deciding the relative importance to be attached to stability of wages and to the frequent changes in the industry's capacity to pay due to fluctuations in wool prices.³

When living costs rise rapidly, as happened during the war and early post-war years, the principle of the living wage inevitably conflicts with the principle of stability. In view of the uncertainty of war conditions the Court was unwilling at first to grant any general increase in the basic minimum rates, but as the minimum rate for labourers was "insufficient to provide them with a reasonable living-wage" it decided in April, 1916, to award a special cost of living bonus.⁴ Later the bonus was awarded to other groups of workers as well. Towards the end of the war, when prices rose more steeply, the bonus was increased and eventually the basic rates themselves were raised. In April, 1919, under special legislation authorising the amendment of existing awards, the Court fixed standard minimum rates for skilled, semi-skilled and unskilled workers and on three occasions, in January, May and November, 1920, these rates were raised to compensate for rising costs of living. In May, 1921, however, the principles of stability and capacity to pay were again given precedence. According to the system of calculation which had been adopted a further increase was due; but the post-war depression had begun and the Court was convinced that it was "no longer possible for the employers of the Dominion to pay increased wages."⁵ To meet the difficulty a stabilisation

¹ Cf. *Awards*, Vol. XXII, pp. 1413-1415.

² Cf. p. 319 above.

³ See, for example, *Awards*, Vols. XXVIII, p. 790; XXXIII, p. 773; and XXXVI, p. 422.

⁴ *Awards*, Vol. XVII, pp. 137-138 (Stringer, J.). The bonus was not enough to compensate for the full rise in cost of living.

⁵ Pronouncement of the Court *re* cost-of-living bonus, 14th May, 1921: *Awards*, Vol. XXII, at p. 805 (Frazer, J.).

scheme was adopted: both the increase then due and the reduction which became due six months later were withheld and in most industries minimum money rates of wages were kept stable from November, 1920, to May, 1922, through the worst period of the depression.

Since current notions of what constitutes a reasonable living wage are always in advance of the lowest wages actually paid and are apt to exceed the limits of industry's capacity to pay, it is inevitable that the Court should have difficulty in reconciling the conclusions suggested by what are in effect opposing principles. When the depressed condition of a particular industry has rendered this difficulty particularly acute the Court's decision has leaned sometimes to the one and sometimes to the other of the principles in conflict. In the Inangahua gold-miners' case in 1918 the Court found that owing to increased costs, due to the war-time rise in prices, many of the mines were being worked at a loss. As the price of gold was fixed any further increase in costs, as a result of a decision to raise wages, would lead to further losses. "On the other hand," the Court observed, "the wages paid to many classes of workers in the industry have, owing to the increased cost of living, fallen so much in purchasing-power that they are no longer sufficient to provide a reasonable standard of living . . . It has been stated by this Court, and also by the Arbitration Court in Australia, that if an industry cannot pay the workers engaged in it a reasonable living-wage it is in the interests of the community that it should cease operations, and that such workers should become absorbed in some other and more profitable industry."¹ The Court decided accordingly to award an all-round increase in wages. Four years later, however, in another gold-mining case, the Court came to the conclusion that wages must be reduced if work was not to cease altogether. Quoting Australian precedents again it observed that "the general rule that if an industry is unable to pay current rates of wages it must close down has been modified by making provision for temporary adjustments in the case of industries, such as mining, that have suffered to an unusual degree from the present depres-

¹ Inangahua gold-miners' award, 6th November, 1918: *Awards*, Vol. XIX, at p. 1061 (Stringer, J.). "If," the Court added, "as was stated at the hearing, it is of great national importance at the present time that there should be no diminution in the production of gold, then the remedy for the present state of affairs seems to be not to permit workers to be employed at less than a reasonable living-wage, but for some assistance to be given by the Government in the shape of a subsidy on the value of all gold produced at a loss, or in some other way" (*Ibid.*).

sion.”¹ It therefore decided to reduce the minimum rate (which had already been adjusted to allow for a fall in cost of living) by 4d. a day, but undertook to make no further change for eleven months, irrespective of any further fall in cost of living.² Some eight years later, in the flax-mills’ case to which reference has already been made,³ a severe contraction in the industry’s capacity to pay was accepted as a reason for reducing the wages of its lowest paid workers to a rate considerably below what the Court had generally regarded as a reasonable living wage.

A somewhat similar evolution may be traced in the policy adopted by the Court in fixing the standard minimum rates of wages applicable to unskilled workers in general. In this case it was the capacity to pay of the country as a whole that had to be considered. As may be seen from the varying form and emphasis of the Court’s arguments, the relative importance which it attached to the living wage and the principle of capacity to pay was influenced both by special legislation and by changes in the economic situation. At the time when the post-war depression developed the legislation which empowered the Court to vary the rates of wages in existing awards required it to have regard to “a fair standard of living.”⁴ By May, 1922, the Court was convinced that some reduction must be made in the standard minimum rates; but in view of the requirement quoted it felt obliged to limit the reduction to an amount smaller than would have been suggested by a consideration of the economic situation alone. “It would, we believe,” the Court stated, “be beneficial to trade and industry if wages were to drop 10s. per week, but a reduction of that amount would involve a reduction below the cost-of-living level, which, though it would probably be temporary, would nevertheless press hardly on a considerable section of the workers.”⁵ The reduction was accordingly limited to 5s.

¹ Waihi gold-miners’ award, Judgment of the Court dated 19th May, 1922: *Awards*, Vol. XXIII, at p. 226 (Frazer, J.).

² Waihi gold-miners’ award, 20th December, 1922: *Awards*, Vol. XXIII, at p. 1330; as amended by Order of 16th February, 1923: *Awards*, Vol. XXIV, at pp. 5-8 (Frazer, J.).

³ Cf. pp. 319 and 327 above.

⁴ Industrial Conciliation and Arbitration Amendment Act, 1921-22, section 9. This requirement applied both to general orders increasing or reducing all award rates and to any special order excluding a particular class or section of workers from a general order. As regards such special orders the Act provided expressly that “the Court shall not reduce the rate of remuneration of any such workers to a lower wage than will, in the opinion of the Court, enable such workers to maintain a fair standard of living.” Cf. also the Industrial Conciliation and Arbitration Amendment Act, 1920, section 8.

⁵ Further pronouncement of the Court re cost of living for period October, 1921—March 1922: *Awards*, Vol. XXIII, at p. 346 (Frazer, J.).

a week. At the same time, however, the Court emphasised the relation between production and wages, and six months later, though it again reduced wages only by an amount corresponding to the fall in cost of living, it came to the conclusion that "the actual fair standard of living must vary with the prosperity of trade and industry and the degree of efficiency attained."¹

The Court's power to vary wage rates during the currency of awards lapsed at the end of 1923 but was revived in 1931 to enable it to deal with the situation created by the great depression. In this case, however, the special legislation, though it required the Court as before to take into account "the economic and financial conditions affecting trade and industry in New Zealand" and all other considerations which it deemed relevant, made no specific reference to a fair standard of living.² The Court continued to regard the cost of living and the living wage as relevant (though not, as in 1922, paramount) considerations, but in explaining its general order of 29th May, 1931, which reduced practically all minimum rates by 10 per cent., it recognised that this reduction, which it considered necessary in view of the fall in national income and in world prices, brought the unskilled rate below the equivalent of the 1914 real wage.³ Since its calculations of the living wage had hitherto been based on this figure⁴ there was at least an implied recognition that the exigencies of a shrinkage in capacity to pay had involved some sacrifice of the principle of the living wage.

IV

As may be seen from the cases cited, there are illustrations in the Court's own statements of most of the possible types of conflict which may arise among its leading principles.

¹ Further pronouncement of the Court *re* cost of living for six-monthly period April-September, 1922, dated 22nd November, 1922: *Awards*, Vol. XXIII, at p. 968 (Frazer, J.)

² Finance Act, 1931, Part II.

³ General Order amending awards, agreements, and apprenticeship orders, 29th May, 1931: *Awards*, Vol. XXXI, at p. 154 (Frazer, J.). The cost of living, it may be noted, continued to fall, but in April, 1932, a further amending Act virtually abolished the obligation to refer unsettled disputes to the Court and made provision for the review of existing awards. The major responsibility for wage policy during the remainder of the depression (and until June, 1936) was thus assumed by the Legislature itself and the Court did not again exercise its power to vary minimum rates of wages by general order. For an account of experience during this period see the writer's article, "The Restoration of Compulsory Arbitration in New Zealand", in *International Labour Review*, Vol. XXXIV, No. 6, December, 1936, pp. 733-771.

⁴ Cf. *Awards*, Vols. XXVA, pp. 800 ff.; XXVI, pp. 570-571; and XXIX, pp. 234-235 and 698.

It should, however, be added that statements containing such illustrations are the exception rather than the rule. Many of the Court's awards give no explanation of the reasons for which they were made and only a small proportion of those which do so reveal at all clearly the extent to which the Court was obliged to limit or forego the application of any of its principles.

Two main reasons may account for this. First, in the great majority of cases the Court might claim that its decisions do in fact conform to all the rules it has laid down. The rules themselves are general in form and such concepts as the living wage and capacity to pay are capable of many interpretations. Changes in the relative importance attached to different criteria may therefore pass unnoticed and conflicts of principle become apparent only infrequently. Second, when an open clash occurs and some principle is sacrificed, it does not necessarily follow that the Court will make a reference to the fact. It is the function of an industrial tribunal to settle disputes, not to create them. Though its decisions have the force of law, that does not make it any the less desirable that they should be willingly accepted by the greatest possible number of the parties concerned. If such acceptance can be facilitated by a demonstration that established principles have been respected there is a strong inducement to emphasise the degree of conformity and to minimise any departure which may have been found necessary.

The Court's practice of stating its wage principles only in very general terms has drawbacks as well as advantages, but the drawbacks are probably less serious than would be those of detailed definition. Though such definition might clarify certain issues which are now confused, it could resolve no fundamental conflict. There is moreover a real danger that it might, by multiplying the rules and precedents which limit the Court's discretion in individual cases, render the whole system of regulation more rigid. Opinions differ as to the proper objectives of wage policy—as to the relative importance, for example, of stable minimum rates and maximum average real earnings. But whatever be the aims in view a considerable flexibility of method is essential if detailed regulation is to be adapted to the varied and ever-changing needs of a multitude of industries.

More useful than any refinement of definitions would

be a more systematic consideration of the economic problems involved in wage regulation, an improvement in the quality and quantity of information at the disposal of the Court, and a closer co-ordination of wage policy with other forms of economic control. While it would be a mistake to exaggerate the assistance which a wage-fixing authority can derive from economic theory it is permissible to think that more use might be made of such guidance as theoretical analysis can give in interpreting the meaning of economic facts and in estimating the probable results of alternative courses of action. A necessary foundation for any development of this kind is an improvement in the information on which the Court must base its judgment of the economic situation and the prospects of employment. Of the information not now available which one would wish to see at the disposal of a wage-fixing authority some—such as net productivity and the elasticity of demand for labour in different industries—may be impossible to ascertain; but there is no reason to think that this need always be the case with such items as up-to-date and comprehensive statistics of production and pay-rolls (by industries) and of rates of wages actually paid, employment and unemployment (by industries and occupations). As to the third point mentioned, the extent of authoritative intervention in other fields—in external trade, exchange and monetary policy as well as in the more obviously related fields of social legislation and industrial organisation—has become so great and its relevance to wage policy so close that systematic consultation among the authorities responsible and some measure of co-ordination would be a logical development.

The Determination of the Rate of Interest¹

By J. M. FLEMING

1. Mr. Keynes and his critics have this in common, that they all look upon the interest-rate as being determined by a system of what might be styled "macro-economic" equations. Their curves describe relationships existing between social aggregates,—collective categories such as "Total Money," "Total Supply of Loanable Funds"—quantities which are arrived at by adding together the corresponding items appertaining to the various individuals who make up the economic community. For purposes calling for estimates of quantitative importance such as statistical testing, forecast, or the framing of policy, and even for purposes of exposition, it is necessary to express the economic system in terms of such aggregates. But no one doubts that a more exact understanding of the underlying relationships can be obtained by "atomic" or "micro-economic" analysis—direct examination of the behaviour of the individuals and institutions who produce, consume, own and administer wealth. When rival "macro-economic" theories are put forward, and still more when it is asserted that there is no real difference between them, recourse should be had to the basic explanation in terms of individual behaviour, from which such theories are, or should be, derived.

According to Mr. Keynes, the rate of interest is the "price" which equilibrates the desire to hold wealth in the form of cash with the available quantity of cash.² That is to say,

¹ This Note relates to the controversy to which the most recent contributions are the article by Mr. Keynes in *Economic Journal*, June, 1937, the three rejoinders by Professor Ohlin, Mr. Robertson, and Mr. Hawtrey in *Economic Journal*, September, 1937, and Mr. Lerner's article in *Economic Journal*, June, 1938. The last I read when this Note was in proof.

² *General Theory of Employment*, p. 167.

it is determined by the facts that the demand for cash (or money), and possibly the supply also, are dependent on the rate of interest, and that demand must equal supply. Professor Ohlin, on the other hand, prefers the formulation that the interest rate is determined by the intersection of the demand and supply curves for claims (credit), though he adds that these curves themselves depend on the quantity of cash and of assets.¹ He accuses the Keynesian formulation relating the interest rate and the demand for money of being incomplete. Mr. Robertson also prefers the "Demand-and-Supply for Credit" theory—for we can identify his "Loanable Funds" with Professor Ohlin's "Credit"—but he holds the two methods to be merely "alternative pieces of machinery"² which arrive at the same results in practice. Mr. Hicks believes the choice between "the ordinary method of economic theory"—which regards the rate of interest as determined by the demand-and-supply for loans—and the Keynesian method to be "purely a matter of convenience"; from this point of view, however, the liquidity-preference approach offers great advantages.³ Mr. Keynes, for his part, will have none of this indifference—for him the theories are "radically opposed to one another".

The argument put forward in the present Note is based on the contention of Professor Ohlin that the rate of interest must be determined within the framework of "the system of mutually interdependent prices and quantities"⁴. From this point of view both the Keynesian method and what Mr. Hicks calls the "ordinary method of economic theory"⁵ are inadequate. When the relationships involved are more fully expressed, the "Demand-and-Supply for Money" theory and the "Demand-and-Supply for Credit" theory become alternative explanations, but only in the sense that either, *combined with still other demand and supply equations*, can be used to determine the rate of interest. Finally it will be argued that the "Liquidity-Preference" method when thus amplified is likely for practical purposes to be a more serviceable instrument than the other.

2. Let us imagine the simplest possible economic system, which will contain all the elements we require. Suppose

¹ *Economic Journal*, September, 1937, p. 427.

² *Economic Journal*, September, 1937, p. 432.

³ *Economic Journal*, June, 1936, p. 246.

⁴ *Economic Journal*, June, 1937, p. 227.

⁵ I do not mean to quarrel with Mr. Hicks's own formulation of the problem, to which, indeed, this Note owes much. Cf. *Economic Journal*, June, 1936, pp. 241, 246.

there are only three kinds of property, goods (real capital), claims to fixed future money payments (say, 'bonds'), and money. Money consisting of banks' demand liabilities is the standard of value and of deferred payments, the medium of exchange, most liquid asset, etc. One's stock of bonds may be positive or negative according as one is a net lender or borrower. If one is a bank one's stock of money may be—will be—negative. Some wealth administrators may have a property holding whose net value, at current prices, is negative. Since there are only three kinds of property, there are only two prices,—“ p ”, the price of goods, and “ i ”, the price of bonds. The price of bonds is, of course, a simple function of the rate of interest and statements made of the one hold also of the other, though with a change of sign.

We wish to examine the price-fixing process as it takes place on any given “day”—a period so short that all transactions may be looked upon as taking place at a unique set of prices prevailing during that day. Each wealth-holder starts the day with a certain inventory of the three sorts of property, which may be regarded as a “legacy” from the operations of the previous day. In addition he produces and consumes goods during the day—the difference representing his real saving or dis-saving. The amount of this “real saving” we may take for the moment as a datum. He is confronted with the market prices i and p , and he proceeds to buy and sell, lend and borrow (and, if he is a bank, issue and withdraw money), until he has arrived at what, at the end of the day, he conceives to be the best possible arrangement of his property. Since there are three kinds of property, three conditions suffice to determine this optimum arrangement. First, he receives by exchange the same value as he gives. The aggregate value of his property at the end of the day is the same as it was at the beginning plus the value of his real saving. The other two conditions are that, at the given prices of goods and of bonds respectively, he has at the end of the day no further desire to buy or sell goods, or to exchange his holding of claims (or debts) against money.

So far we have taken p and i for granted. But wealth-holders can only exchange with each other. This implies a “market equation” for each type of property. Aggregate purchases of goods equal aggregate sales. Aggregate increases of bond holdings plus reductions of bonded debt equal aggregate reductions of bond holdings plus increases of

debt. Aggregate increase of money holdings plus reductions in banks' demand liabilities equal aggregate reductions in money holdings plus increases in banks' demand liabilities. For practical purposes, and also for purposes of comparison with current theories, it is best to throw these equations into the form of "gross" instead of "net" demand-and-supply equations.¹ Since the increase in an individual's holding of goods equals his real saving plus what he buys and minus what he sells, the first market equation can take the form that the aggregate holding of goods (Demand) equals the aggregate "legacy" of goods plus the aggregate real saving (Supply). Similarly, but bearing in mind that the legacy of debts equals the legacy of bond holdings, the quantity of bonds held (Demand) equals the quantity of debts (Supply). Finally, the quantity of money held (Demand) equals the quantity which banks issue (Supply).

The question is: what, if any, arrangement of p and i will satisfy the market equations and so ensure that the exchanges can be carried out as desired? Now, whatever the prices, as we saw, the individual receives by exchange the same value as he gives. Throw this into the "gross" form, and aggregate for all individuals, and you have the condition that the aggregate value of property at the end of the "day" must equal the aggregate value of the "legacies" plus the aggregate value of real saving. This being so, it may be seen that any two of our market equations imply the third, so that it is only necessary to satisfy two of them to satisfy them all.

We remember that for each individual, given his legacy and his real saving, given the prices p and i , and given his scale of preferences (at the end of the "day") for all conceivable combinations of the different kinds of property, his holding of each class of property was determined. Thus his holding—positive or negative—of each class of property may be regarded in general as a function of p and i , the shape of the function depending on his "legacy", and his preference scale, which for the moment we can accept as independent. The market equations—which are "macro-economic" in character—are formed by the aggregation of the demands and supplies of individuals. Thus the Demand for Goods, the Demand for and Supply of Loans, and the Demand for and Supply of Money, are all in general functions of p and i —

¹ See the distinction made by Professor Ohlin: *Economic Journal*, June, 1937, pp. 224-5.

of the price of goods and the rate of interest. Each market equation defines a relationship between p and i , which will ensure that demand and supply balance on the market. Consequently any two market equations—those for goods and money, those for goods and bonds, or those for bonds and money—will suffice to determine those values of p and i which will secure equality of demand and supply in those two markets, and, as was explained above, in the third market as well.¹

Though each wealth-holder is, in principle, liable to hold varying quantities of all of the three types of property, it is always possible that his particular scale of preferences may restrict his choice to two types or even only one. For example banks may be supposed to deal only in bonds and (negative) money—not at all in goods. Here the individual gross demands for claims and gross supplies of money are functions of i alone. Since the aggregate Supply of Money is attributed entirely to banks, it is dependent only on i and not on p . The same thing may be true of other Demands and Supplies, but, of course, in each case there must be some special reason, relating to individual preference scales, why one of the prices can be regarded as irrelevant. If for example it could be shown that p has no influence on anyone's demand for money, then the Keynesian liquidity-preference theory of the rate of interest would be at least formally correct, since i could be determined by the market equation for money alone.

We may exclude from consideration wealth-holders whose money stocks are invariable whatever the price structure. If other money holders either never held goods or never varied their holdings of goods, then it might be that the Demand for Money would be quite inelastic with respect to p . But if, as is surely the typical case, an individual or firm holds, and is willing to vary, all three classes of property, he must be willing to exchange goods for money when p changes, or at least to exchange bonds for money when, $\frac{p}{i}$ and p having altered,² he exchanges bonds for goods.

¹ If we choose to complicate our idyllic economic system by introducing debts of various sorts and maturities, and also ordinary and preference shares, we shall thereby introduce an equal number of new prices and new market equations, but no new points of principle. We shall always have an equation to spare, and we shall always include all the prices—failing some special reason to the contrary, as explained below—in each of the equations.

² $\frac{p}{i}$ is, of course, the market value of goods in terms of bonds, and is directly relevant to the choice between holding goods and bonds.

For as a business man, when p and $\frac{p}{i}$ fall, sells bonds, or increases his indebtedness in order to purchase goods, the special advantages offered by holding bonds become scarcer to him, or the special disadvantages of being in debt become more irksome with the increase of indebtedness, and he is likely, interest rate remaining the same, to draw on his cash balance in order to increase his holding of bonds or to reduce his indebtedness.

At this stage it may be opportune to introduce the possibility that the production, the consumption, and hence the real saving of such wealth-holders should be regarded as dependent on the price of goods. Suppose that a rise in p evokes an expansion of production accompanied by a lesser expansion in consumption, i.e. leads to increased saving. What would be the consequence of this increase in saving resulting from a hypothetical rise in p ? It would mean an increase in the supply of goods-to-hold without necessarily involving an equivalent increase in the demand. The savers would probably seek to utilise part of their increase in wealth to increase their holdings of money and bonds to reduce their indebtedness. Others would, as previously explained, be moved to similar action by the mere fact that goods cost more. But if this is so, Demand for Money depends on both i and p , and interest cannot be determined by the market equations for money alone. Probably no one would seriously maintain that interest could be determined by the market equation for bonds alone. The supply curve of bonds with respect to i is usually regarded as itself dependent on p . Sometimes it is not made evident that the demand curve is similarly dependent. Is it not, in any case, somewhat misleading to use the Marshallian apparatus of partial demand and supply curves in cases where the variable in question is as much influenced by some price which is excluded from the picture as by the price against which it is plotted to form the curve?

3. Granted then that we have to determine i and p simultaneously and that we have to use two market equations for the purpose, which two is it most suitable to employ? No one has suggested neglecting the market equations for goods, and it would certainly be unwise to do so, chiefly because, when we relax our assumptions about the quantity of goods being fixed and the scales of preferences being

given, the important influences of changes in the quantity of goods and in the attractiveness of investment are best illustrated from this equation. This leaves us with the alternative of using the market equation for bonds, or that for money—not to determine the rate of interest but to complete the system whereby interest and the price of goods are simultaneously determined.

Our choice will depend upon the applications which we intend to make of our theoretical scheme. If our aim is to explain the movements of i over a period of time then we shall have to try to set up relationships which will be fairly constant, not only on any given "day," but over a succession of "days". Here we must remember that underlying our various equations for the given "day" was the datum of the "legacy" of the different sorts of property left over to the different wealth-holders from the previous "day". Over a succession of "days," of course, the "legacy" cannot be taken as a constant. Its amount and its distribution vary from day to day as a result of the exchanges of property, and the savings and dis-savings of the various individuals. The total value of the "legacy" is the same thing as the total value of the quantity of goods in existence. It is easy to include this¹ as an independent variable in our equations—though of course it is dependent on the course of *previous* development—but there is no way of introducing into "macro-economic" equations the influence of the interpersonal distribution of the "legacy". It will be an advantage, therefore, to use equations which will not seriously be harmed by the neglect of this factor. This might perhaps safely be said of all our market equations in so far as their outcome is concerned. But it would seem likely that changes in distribution of property, while not greatly affecting the relationship between i and p established by the market equation for bonds, might often shift demand and supply both in the same direction. More generally—i.e., taking account of those factors which underlie the preference scales—the difficulty of making use of the market equation for bonds is that both demand and supply react to the same influences, though, of course, in different degrees and in the opposite directions. Thus if multiple correlation analysis is used to provide a quantitative expression for the theory, it becomes practically

¹ Or rather, since this is a multiple of p , simply the quantity of goods.

impossible to distinguish thereby two separate functions, for supply and for demand. From the practical viewpoint, therefore, it seems preferable to work with the market equation for money.

4. It might be objected to this reasoning that, in any case, hopes of constructing demand and supply functions, whether for money or for goods, which would be valid for a series of "days," are chimerical. The influence of the changing "legacies" might, *à la rigueur*, be represented by the magnitude of the stock of goods—but what of the scales of preference which, given for the "day", may vary considerably from day to day? We must deal with this problem by seeking to dig out the principal factors underlying the scales of preference, to find magnitudes capable of standing for these underlying factors—whose inner nature may not be properly quantitative at all—and to include these magnitudes as variables helping to determine the demand or supply in question. Let us deal shortly with this matter as it affects the demand for money (the supply is more straightforward).

Mr. Keynes has familiarised us with three motives for holding money—the "transaction motive," the "precautionary motive," and the "speculative motive". The first two relate to the special advantages which money possesses with respect to liquidity and security; the last refers to the anticipated profitability—positive or negative—involved in holding bonds rather than money. But just as we found it to be necessary to include p with i as influencing the demand for money, so now we must take into account the anticipated profitability of holding goods—i.e., of industry and commerce—as well as that of holding bonds. It is surely impossible to contest the importance of the consideration, e.g., in determining the size of a firm's idle balances.

Factors affecting preference scales can then be classified in the following, somewhat artificial, manner: changes in the relative advantages of money and bonds with respect to (a) liquidity and (b) profitability; changes in the relative advantages of money and goods under the same heads; changes in the relative attractiveness of liquidity and profit. Changes in the liquidity-yield of the different types of assets are perhaps not normally of great importance for the demand for money. In any case it would be difficult to find a quantitative expression for this factor. On the other hand

changes in the anticipated money return on holding goods and bonds respectively (including in this term both yield and capital appreciation) are of first importance. In the case of goods, particularly for long term movements, it is doubtful whether we should regard anticipations of higher yields as altering the scales of preference ; it might be more significant to regard them as reducing the unit of measurement of goods to which the preference scales relate. To put the same thing in a different way, it might be better when comparing preference scales for goods, claims and money at different time points to think of "goods" not as physical magnitudes but as sources of money-yield of a given time-shape and a given probable magnitude.¹ p then becomes a simple function of the rate of yield on investment. Obviously it is difficult to find a satisfactory magnitude, chosen from current or previous economic events, to stand for *anticipated* capital appreciation on goods. A similar difficulty, and a more serious one (if money is more substitutable vis-à-vis claims than vis-à-vis goods) confronts us when we attempt to measure the anticipated appreciation on bonds. In these cases we must seek to discover whether the rates of change of the prices of bonds and goods cannot be made to provide working approximations for anticipations.

As to the changes in the relative "needs" for liquidity-return and for the special kinds of money-returns obtainable on claims and goods respectively, the dominant factor here seems to be the variation in the demand for liquid assets arising out of the changes in the flow of money-payments. Probably, from time to time changes in attitude occur which cannot be explained in terms of economic magnitudes, and which in some cases defy rational explanation of any sort. Nevertheless, before the case is given up as hopeless the attempt should be made to see whether the more measureable and systematic factors do not between them account for the known movements in the quantity of money which people have in the past been willing to hold.

¹ The object in changing the unit of measurement is to obtain greater stability in the scales of preference through time. A further step to this end would be to vary the unit of money in accordance with a price index. Preference scales would then relate to 'real' balances, and the quantity of bonds and goods-to-hold would be measured in terms of anticipated 'real' yield.

Live and Dead Issues in the Methodology of Economics

By LIONEL ROBBINS

I

1. The purpose of this note is a very humble one ; it is an attempt to eliminate certain causes of unnecessary confusion. In the last ten years much has been written both by professional economists and by laymen on the methodology of economics. Some of this, as it seems to me, has been concerned with live issues—with issues, that is to say about which intelligent men may well differ even when they have become fully aware of each others premises. But some of it seems to rest upon misunderstanding and to relate to issues upon which there is no real dispute once the question is clearly stated. This note merely attempts to separate out some of these issues, particularly those that relate—or are thought to relate—to the vexed question of the status of realistic studies—to separate the quick from the dead in order that we may not any longer be encumbered by the latter. I hope that the absence of references will not be misunderstood. It would be easy enough to indicate the authorship of the misconceptions which are mentioned ; and in certain cases the temptation has been strong. But I cannot help thinking that the purpose of the note is better served by deliberately refraining from assigning responsibility for what may seem to be obvious error. The issues are intellectual, not personal.

II

2. To deal first with dead issues. That the object of economics is to understand reality is not a proposition which is likely to be questioned by any economist. Indeed, if this had not actually been questioned by others, an apology would be necessary for stating anything so obvious. It is possible that, in the course of discussions of the exact nature

of some of the postulates of pure theory (see paragraph 5 below) phrases may have been used—the “logic of choice”, “deduction from the nature of the economic”, for instance—which, to those who are not acquainted with the exact context of the discussion, may suggest something else. But whatever may be the impressions of laymen, I cannot conceive the economist whose aim is not to understand reality; and I do not think that the whole literature of economics could furnish any fair quotation which could be adduced to show the contrary. As I myself have been pilloried as a sort of scientific antichrist in this connection, perhaps the following quotation from one of my own works may not be thought to be inappropriate:—

“It is a characteristic of scientific generalisations that they refer to reality. Whether they are cast in hypothetical or categorical form, they are distinguished from the propositions of pure logic and mathematics by the fact that in some sense their reference is to that which exists, or that which may exist, rather than to purely formal relations.

“In this respect, it is clear, the propositions of economics are on all fours with the propositions of all other sciences. As we have seen, these propositions are deductions from simple assumptions reflecting very elementary facts of general experience. If the premises relate to reality the deductions from them must have a similar point of reference.

“It follows, therefore, that the belief often expressed by the critics of economics, that it is a mere system of formal inferences having no necessary relation to reality, is based upon misconception. It may be admitted that our knowledge of the facts which are the basis of economic deductions is different in important respects from our knowledge of the facts which are the basis of the deductions of the natural sciences. It may be admitted, too, that, for this reason, the methods of economic science—although not the tests of its logical consistency—are often different from the methods of the natural sciences. But it does not follow in the least that its generalisations have a ‘merely formal’ status—that they are ‘scholastic’ deductions from arbitrarily established definitions

“It follows, too, that it is a complete mistake to regard the economist, whatever his degree of ‘purity’, as

concerned merely with pure deduction. It is quite true that much of his work is in the nature of elaborate processes of inference. But it is quite untrue to suppose that it is only, or indeed mainly, thus. The concern of the economist is the interpretation of reality. The business of discovery consists not merely in the elucidation of given premises but in the perception of the facts which are the basis of the premises."¹

I do not think that the terminology of this passage is very felicitous. I can see all sorts of live issues concerning method lurking about the hinterland of certain sentences. But I do not think it is a very live issue to discuss whether its author believed that, in some way or other, it was his duty to study the real world.

3. I do not think that the issue is much livelier concerning the nature of that aspect of reality which economists have to study—the so-called question of scope.

In recent years, following Menger, some of us have canvassed the claims of definitions which explicitly draw attention to that fundamental limitation of goods in relation to wants which is the condition of the existence of conduct having an economic aspect. Economics, we have suggested, is essentially the study of the disposal of scarce goods and services.

This suggestion has not met with universal acceptance. But the difference between this and other definitions now current is not a very serious matter. It is probable that those who do not find this definition acceptable would prefer some such definition as that of Professor Pigou who regards economics as concerned with conduct which can be brought into relation with the measuring rod of money. As I have explained elsewhere, I myself feel that this suggests an unnecessary restriction of the subject matter of economics to a certain institutional setting. But this is a very minor point indeed. We surely can all agree that, in order that conduct may be brought into relation with the measuring rod of money, it must concern goods and services which are scarce. Whether we define the actual subject matter of study in terms which cover all institutional settings (the "scarcity" definition) or limit it to those settings with which we are most preoccupied (the "exchange" definition), is not a matter about which sensible people will waste many precious moments.

¹ *An Essay on the Nature and Significance of Economic Science*, 2nd Edition, 1935, pp. 104-5.

The only question with regard to the scope of economics which can be said to be in any sense alive, is the question whether economics, as such, can be said to include judgments of what is good or bad in the world of relative scarcities, as distinct from judgments of what exists or what might be conceived to exist. Here at least there is some appearance of difference. To many of us it seems that there is a definite difference of status between the proposition, for instance, that a market tends in a certain direction and the proposition that it is good that it should so tend. The one seems to be a judgment of fact—a proposition of what I should call economic science—the other a judgment of value—a proposition of what I should call ethics or social philosophy—and I should have thought that such a difference was fairly well established. But, in recent years, there have been some who have urged that the distinction should not be made. Economics, they say, should include both judgments of fact and judgments of value. Those who say otherwise are condemning it to a position of triviality and insignificance.

At first sight there seems complete deadlock. In fact, however, it usually turns out that those who adopt this latter attitude, are concerned not so much with problems of definition as with problems of conduct or deportment. They think that the economist will sacrifice opportunities for usefulness if he abstains from excursions into social philosophy and (apparently) they think that if such excursions are not dignified by the title, economic science, he may feel precluded from making them. The warning may be necessary. But the psychology may be questioned. To me at least, it seems difficult to believe that recognition of the distinction between the two kinds of proposition will prevent any man of spirit from being interested in both; and I certainly think that there is considerable utility in realising that the kind of test to which we may appeal in the one case is not available in the other. (I can prove by well-known methods of research that Professor X has devoted scarce time to controversy with Professor Y; but the proof that it was a good thing that he should have done this, rests on a different kind of argument.) I should, however, be the first to agree that the economist who thinks that his subject is capable of being used as a basis for policy without further appeal to social philosophy is cherishing a naïve delusion. My

innocent remark that "equilibrium is just equilibrium" meant exactly that. And if I found anyone who could not pluck up courage to indulge in the relevant social philosophising unless he were permitted to call it economics, I should regret the inhibition as tending to mislead the laity. But I should not make it the subject of great lamentation.¹

4. We have just seen that it is not disputed that the object of economics is to understand a certain aspect of reality. It is equally undisputed that, in order to understand reality, reality must be studied. Here again, if it were not for the misunderstandings of the recent past, an apology would be due for emphasising the obvious. I do not think that there is a single professional economist living who would dispute that the appropriate method of economics is the construction and development of hypotheses suggested by the study of reality and the testing of the applicability of the results by reference back to reality. There will obviously be legitimate differences of opinion concerning the reliability of particular forms of deduction and induction. And as we shall see later on, there are differences between the social sciences and the natural sciences, both in regard to the nature of the material handled and in regard to the reliability of the results of empirical tests, which may easily give rise to problems about which reasonable men may hold very different views. But on the necessity for the combination of deduction and induction, of theory and realistic studies, there is no dispute among sensible people. In a subject so wide as economics it is natural that there should develop some division of labour, that some should specialise on the more theoretical developments, some on description and verification. But it is not true that those whose interests are predominantly theoretical take a view of their functions any different from the view of his functions taken, let us say, by the theoretical physicist.

It is no more true that, in the majority of centres of study, the theoretical branches of our subject are cultivated at the expense of the applied—often as outside opinion may assert the contrary. On the contrary, it is probably true to say that, in the past, the development of pure theory has lagged behind because of the greater prestige of studies having

¹ If the resuscitation of the old term Political Economy were acceptable as a rough description of this type of speculation, I think that perhaps we might agree even upon terminology.

more immediate relevance to practice. And because of the exigencies of the teaching programme in the relatively small departments of economics, characteristic of many British Universities, there is not much time for excessive concentration on pure theory. It is only in a few privileged centres that any considerable division of labour has proved to be possible ; and even here the extent to which it actually goes is capable of grotesque exaggeration.¹

What is true, of course, is that there is not yet nearly enough quantitative investigation of the applicability of the conclusions to which recent theoretical developments have given rise. Recent speculation has shown us a vast range of possibilities : until we have much more quantitative knowledge about the real world, we have to rely chiefly on hunch to say which possibility is probable. As Mr. Keynes has well put it : " Before we can either perfect our theory or apply it with safety to practical issues, there is another kind of knowledge which we need to increase :—namely, exact quantitative information concerning contemporary transactions The collection and arrangement of comprehensive statistics is of vast importance ' in order to eliminate impressionism.' ”²

To do this, however, two conditions are essential—willingness on the part of governments and the business world to provide access to the facts, and sufficient endowment of faculties of economics to provide the computing and collecting assistance which such types of work necessarily involve. Unfortunately, in Great Britain at least, neither of these kinds of assistance has very often been forthcoming. But on the necessity for such developments there is not, and there has not been, any disagreement whatever.

III

5. There are, however, two questions, apt to be confused with this, on which disagreement is still very lively.

The first of these relates to the exact logical status of certain of the more general assumptions on which pure economics is based. It is well known that much of the structure of pure analysis depends upon assumptions of

¹ Thus for instance, at the London School of Economics, of some twenty-five members of the Economics Departments, not more than three or four can be regarded as predominantly specialised on pure theory.

² *Treatise on Money*, Volume II p. 407. It is curious that the author of this passage and the distinguished contribution to the applied theory of money in which it occurs, should have recently been singled out for public censure for " unscientific " methods of procedure.

a very general character—the so-called economic principle, the assumption of an order of preference, etc. Now concerning the status of these assumptions there exist very lively differences. One school of thought regards them as essentially rational principles which are given *a priori* and which, while they show themselves in experience, yet require no appeal to experience to demonstrate their ultimate validity. Another, while not disputing the wide generality of their applicability, regards them as being derived from experience and having the same provisional status as the more obviously empirical assumptions. The former view has been very powerfully urged by Professor Mises and Dr. Bernardelli, the latter by Dr. Kaufmann and Mr. Hutchison among others; and dispute is still very active.

Now this is a matter of fundamental philosophical interest; and it is by no means to be regarded as settled by off-hand reference to fashionable beliefs regarding the logical status of the principles of the natural sciences. There could be no worse example of *a prioriism* in methodology than the calm assumption that what may be true of one branch of knowledge is necessarily true of others, without detailed examination of the body of knowledge which it is desired to classify. There are very fundamental epistemological questions involved here; and he would be a bold man who would regard the problems of epistemology as settled. I myself would confess to real doubt on the issue; and in the work alluded to above I have tried—in the first edition unsuccessfully, in the second, I hope, with greater, if not complete, success—to use a terminology which steers clear of the ultimate questions involved.

But whatever may be the truth about this most difficult question, it must be insisted that its interest lies outside economics. It is philosophical rather than practical. Whether we think that the main assumptions of the pure theory of choice rest upon observation or upon *a priori* knowledge, we all agree about the main conclusions. If they rest upon *a priori* knowledge then, to that extent they are certain: If not, even so it would still be agreed that the facts of experience corresponding to these particular assumptions are so general that they may be treated *as if* they were certain. Only one who knew nothing about pure economics could contend that the assumptions in question have been insufficiently tested.

Moreover, whatever the solution of the problem, its effects on practice would be very little. For no one has contended that conclusions drawn from the so-called *a priori* principles can be applied to the interpretation of particular cases without the use of supplementary assumptions whose foundation is obviously empirical and whose applicability must therefore be the subject of continual verificatory tests. If the widest claims of *a prioriism* were generally admitted, the necessity for continuous empirical study would not be in the least diminished.

6. There is, however, another issue which at first sight has a greater bearing on practice. It concerns the exact significance to be attached to the results of certain kinds of observation. Since probably it is misunderstanding of the implications of this controversy which has led to most of the current misconceptions concerning the status of realistic studies, it is perhaps desirable to deal with it in rather greater detail.

Let me try to make precise the exact nature of the methodological issue: its implications for practice will then become fairly obvious.

It will be generally agreed among those who have given serious attention to the facts that, whatever their exact logical status, the assumptions of what is usually called pure theory permit a considerable elaboration of deductive reasoning, which, with judicious choice of supplementary assumptions, can usefully be applied to the interpretation of a very wide field of phenomena. Whether, as some think, they are based upon rational principles or whether they are based upon experience so general that it is difficult to conceive situations to which they do not apply, these principles, like the principles of classical mechanics, are for practical purposes to be regarded as having an applicability which, if not ubiquitous and permanent, is at least sufficiently widespread to make it superfluous to bother much about them, each time they are involved. We should all agree that the mythical Schmoller student who, after five hundred pages of statistical investigation, decided that the price of pork in the Eastern District of Berlin in the years 1895-1900 was "determined by supply and demand", had been wasting his time.

We are also in agreement that, if we are to go much beyond qualitative generalities, we need further information

of a much more specialised character. On the assumption of normal demand conditions we can deduce, for instance, interesting propositions about the *direction* of probable price change. But to arrive at knowledge about the *magnitude* of change we need information about elasticity.

There is no disagreement, therefore, about the desirability of statistical knowledge here. If the mythical Schmoller student had given us information about elasticity we should all agree that he would not have been wasting his time. But there is disagreement about the interpretation of the significance of such information once it is procured. Some think that by sufficient statistical investigation of this sort we can discover permanent quantitative laws and in this way put economics on the same footing in this respect as the natural sciences. Others—I count myself of their number—are doubtful of this. They think that there are reasons inherent in the nature of our subject matter why this hope is vain. To quote Professor Pigou:—

“Even if the constants which economists wish to determine were less numerous, and the method of experiment more accessible, we should still be faced with the fact that the constants themselves are different at different times. The gravitation constant is the same always. But the economic constants—these elasticities of demand and supply—depending, as they do, upon human consciousness, are liable to vary. The constitution of the atom, as it were, and not merely its position, changes under the influence of environment. . . . This malleability in the actual substance with which economic study deals means that the goal sought is itself perpetually shifting, so that, even if it were possible by experiment exactly to determine the values of the economic constants to-day, we could not say with confidence that this determination would hold good also of to-morrow.”¹

No doubt even here it would be very unwise to push scepticism all the way. It may be that, although some of the “constants” are liable to rapid change, so that statistical findings which are valid to-day are no longer valid to-morrow, others have a rather more long-lasting validity. Examples will readily occur to those familiar with the econometric literature of recent years. Nevertheless I think there is a real divergence of opinion here which probably ultimately

¹ *Economics of Welfare*, 3rd Edition, pp. 9-10.

involves deep-seated differences concerning the place of consciousness in the universe.

But—and this is the point which is so often misconceived—whatever view we may take on this issue, our views on the desirability of bigger and better realistic studies are certainly not affected unfavourably. Indeed, if we take—as I take—the more sceptical view, our view of the importance of such studies will be enhanced rather than diminished. Popular inspection of recent methodological discussion of these matters has jumped to a conclusion which is precisely the opposite of the truth. If we are really convinced that we have, as it were, continuously to rediscover the magnitude of some of our constants, then how much more urgent, how much more obligatory, are the claims of continuous investigation. The chemist or the physicist may indeed hope that within a finite time, he, or at least his descendants, may have discovered *all* the necessary empirical information—applications thenceforward to be a matter of tables and formulæ. But for the economist if he wishes—as we all wish—to go beyond mere qualitative generalisation, there can be no such hope. Day by day, in Sisyphean-like activity, he must discover his coefficients anew.

IV

7. I conclude with one reflection of a rather wider nature. The term methodology, as it is used in connection with economics, has come to cover two distinct, though perhaps related, fields of discussion. On the one hand it covers discussions concerning the way in which our investigations should be conducted—the problem of method in the narrow sense—on the other hand, discussions concerning the nature of the subjects studied and the significance and logical status to be attached to the results achieved.

Now it has always seemed to me that it is the second of these groups of topics which, at our present stage of development, offers problems of real intellectual interest. Now that we have a great mass of detailed studies which, we are convinced, mean something, it is surely useful to try to ascertain exactly what is their general field of reference and what degree of significance can be attached to their results. It is useful both for purposes of systematisation and for purposes of application. To know the ultimate

nature of our subject matter is to be in a position, as Marshall would say, to perceive the one in the many and to establish relationships between propositions hitherto regarded as discreet. To know the logical status of our conclusions is to be in a position to apply our knowledge and to establish fruitful relationships with other fields of research.

The first group of topics, questions relating to procedure, has always seemed to me to offer much less scope for interesting or fruitful speculation. To discuss the method appropriate to a particular enquiry which one is about to undertake is a useful and often enthralling occupation. But, at this distance from Galileo and Newton, to discuss the method of any science *in vacuo* does not seem particularly necessary or entertaining. Perhaps there was a stage in the history of economics when this needed to be done; although I am inclined to believe that the main interest of the methodological discussion here has always been in the other field. But for practising economists, at any rate in England, this is surely a closed question. We all agree that in general we need both induction and deduction, observation and theoretical system; and that the important thing is to suit the method to the job. I can conceive that, from time to time, in regard to whole groups of topics, some emphasis one way or the other may be needed. In regard to recent developments of the theory of money, for instance, it may be salutary to emphasise the need for verification; in regard to historical studies of certain secular trends, it may be useful to press for more precise statement of the hypotheses which it is desired to verify. But in general, surely, the thing is sterile. Only in discussion of the significance of our results, do considerations regarding the respective rôles of different methods present problems of sufficient general interest to warrant separate discussion.

It is no accident of personal predilection, I suggest, that in the classification attempted above, both the live issues (paragraphs 5 and 6) are questions relating to the logical status of our assumptions or our results, whereas the issue of method in the narrow sense (paragraph 4) is to be found in the catalogue of issues that are to be regarded as essentially dead.

A Note on the Pure Theory of Consumer's Behaviour: An Addendum

By P. A. SAMUELSON

IN the February issue of this journal I suggested that the theory of consumer's behaviour could be founded on three postulates: (1) that the amount demanded of each commodity be a single valued function of all prices and income; (2) that this function be homogeneous of order zero in the variables prices and income, i.e., the simultaneous doubling of all prices and income must leave all quantities demanded invariant; (3) that the individual always behaves consistently in the sense that he should never "prefer" a first batch of goods to a second at the same time that he "prefers" the second to the first. "Preference" was defined in a special sense so that the mathematical statement of the third postulate was

$$\sum_{i=1}^n p_i^0(\psi_i^1 - \psi_i^0) \leq 0 \text{ implies } \sum_{i=1}^n p_i^1(\psi_i^1 - \psi_i^0) < 0$$

where the points are distinct.

Since publication, I have discovered that this postulational base is redundant in the sense that postulates (1) and (2) are already implied in postulate (3), and hence may be omitted. In other words, postulate (3) alone is necessary and sufficient for all the developments in my note and, if the argument there is acceptable, for most of the empirical meaning of the utility analysis.

The proof that (1) and (2) are implied by (3) is very simple. Two separate proofs are not necessary.

Suppose an initial situation of prices and income and corresponding quantities $(p_1^0, \dots, p_n^0, I^0)$ and $(\psi_1^0, \dots, \psi_n^0)$. Suppose a second set of prices and income, each being respectively m times that of the previous situation, $(mp_1^0, \dots, mp_n^0, mI^0)$ and $(\psi_1^1, \dots, \psi_n^1)$. We wish to prove that

$$\psi_i^1 \equiv \psi_i^0 \quad (i = 1, \dots, n)$$

i.e., that the two batches of goods are identical in every respect.

From our hypothesis,

$$\sum_{i=1}^n p_i^0 (\psi_i^1 - \psi_i^0) = 0$$

and
$$\sum_{i=1}^n p_i^1 (\psi_i^1 - \psi_i^0) = m \sum_{i=1}^n p_i^0 (\psi_i^1 - \psi_i^0) = 0.$$

This is a contradiction to postulate (3), and hence the two points cannot be distinct; i.e., they must be identical, and so our theorem is proved. For $m=1$, postulate (1) emerges as a special case of postulate (2).

I take this opportunity of enclosing a list of errata which unfortunately appeared in my previous note.

ERRATA

p. 65, line 6: Read "batch (ψ) was selected over (ψ')" for "batch (x) was selected over (x')".

p. 65, equation (5.31): Read " $(\psi) \otimes (\psi')$ " for " $(\psi) \oplus (\psi')$ ".

p. 65, equation (6.01): Read " $(\psi') \otimes (\psi)$ " for " $(\psi') < (\psi)$ ".

p. 65, equation (6.02): Read " $(\psi) \otimes (\psi')$ " for " $(\psi) \neq (\psi')$ ".

p. 66, equation (8.02): Read " $\sum_{i=1}^n \psi_i (p_i + \Delta p_i) > \dots$ " for " $\sum_{i=1}^n \psi_i (p_i \Delta p_i) > \dots$ ".

p. 67, equation (10.02): Read " $\dots + \sum_{i=2}^n \Delta \psi_i \Delta \beta_i < 0$ " for " $\dots + \sum_{i=2}^n \psi_i \Delta \beta_i < 0$ ".

p. 67, line 18: Read "where $\beta_{ij} = \frac{\partial \beta_i}{\partial \psi_j}$ " for "where $\beta_{ij} = \frac{\partial \Sigma_i}{\partial \psi_j}$ ".

p. 67, equation (12.0): Read " $\sum_{i=2}^n \sum_{j=2}^n (\dots$ " for " $\sum_{i=2}^n \sum_{j=1}^n (\dots$ ".

p. 68, equation (12.02): Read the second determinant > 0 instead of < 0 .

p. 69, equation (15.1): Read " $\alpha_{ij} = \dots + h_i^j \psi_i = \alpha_j$ " for " $\alpha_{ij} = \dots + h_i^j \psi_j = \alpha_j$ ".

p. 69, line 19: Read "every $(n-1)^2$ principal minor" for "every $(n-1)^2$ minor".

p. 70, equation (19.0): Read " $N_{11} + N_{12} + \dots$ " for " $N_{11} + N_{12} + \dots$ ".

Book Reviews

The National Capital and other Statistical Studies. By Lord Stamp.
P. S. King (London). 1937. 299 pp. 10s. 6d.

With one exception the eight papers collected in this book have appeared only in the *Economic Journal* or the *Journal of the Royal Statistical Society*. Three deal with National Capital, two each with National Income and with Profits and there is one interesting paper on Alcohol as an Economic Factor. The papers are, however, of such permanent value that their publication in book form is especially welcome and they gain considerably by being read together. Moreover, the opportunity has been taken of bringing the statistics up to date and of revising the texts of the papers where necessary.

Pride of place is given to Lord Stamp's Presidential Address to the Royal Statistical Society on the National Capital, which is supported here by two short papers on Inheritance and on the Economic Distribution of National Capital. In his Presidential Address, Lord Stamp made estimates of the national capital for 1928 and he now gives corresponding totals for 1935. He has revised his 1928 estimates by increasing the mean value of government and local property by £300 millions and the mean value of real property by £150 millions (this last correction, though given in the text, is omitted from the final resulting table on page 30). His estimates of national capital in 1935 are made by applying appropriate multipliers to income from different kinds of property assessed for income tax purposes in 1934-35. In comparing the change in national capital between 1928 and 1935 the results obtained differ considerably according to whether the National Debt and debts of Local Authorities are deducted at their nominal value or at the market value of the corresponding securities.

The paper on Methods Used in Different Countries for Estimating National Income sets out clearly the difficulties of estimating the total of national income and its distribution by kinds but it does not deal with its distribution among individuals. He does, however, consider the distribution of sur-tax incomes in his well-known paper on The Influence of the Price Level on the Higher Incomes. It is perhaps a matter for regret that this paper is reproduced without the discussion it raised at the Royal Statistical Society on the question of the appropriate method of "deflating" changes in incomes for changes in prices. It is unfortunate for this purpose that there is no information as to the turnover of the personnel of the sur-tax class. Since so large a proportion of incomes over £2,000 is derived from investments, some

correlation might be expected between changes in higher incomes with changes in trading profits and a comparison of the graphs on pages 63 and 153 suggests this. Lord Stamp has been responsible for the pioneer work on changes in profits in this country and the two papers reproduced here give figures, first for the pre-war years, and secondly for the post-war period up to 1936.

H. CAMPION.

The Economic and Social Foundations of European Civilization. By Alfons Dopsch. London: Kegan Paul, Trench, Trubner & Co. 1937. xvi + 404 pp. 21s.

The name of Alfons Dopsch needs no introduction to readers of *ECONOMICA*. The present volume is a translation from the second edition (1924) of his *Wirtschaftliche und Soziale Grundlagen der Europäischen Kulturentwicklung*: some omissions (at points indicated in footnotes) have enabled the translators to compress their version of the two German volumes into one stout, compactly printed volume.

This is not the place for a detailed discussion of Dopsch's views on economic conditions from Cæsar to Charlemagne. That appallingly difficult period is becoming more and more at the mercy of local historians who for more than a generation have been piling up masses of more or less probable facts. The simple tale of the chronicles has been left far behind: the folklaws and their exponents are viewed by the author with some suspicion, and newer techniques are hailed as surer guides—especially archæology and place-names. These latter studies are undeniably fascinating, but those who have not made their profession of faith in one or other of these folds, find it difficult at times to regard their results as more than corroborative detail in a narrative which should base its convictions on more substantial grounds. The author repeatedly states his high opinion of archæological evidence, but one of the great merits of his book is that he combines the discussion of a large number of individual local problems into a general synthesis, maintaining in the meanwhile a vigorous polemic against those who predicate the primitive equality of the Germans, their communism, their rapine, their barbarousness, their nomadism, their closed domestic economy and their ignorance of trade before, during and after the settlements. As alternative theses he proposes the primitive feudalism of the Germans, their early manorial tendencies, the survival of Roman agrarian methods, the great influence of the nobility on the political, agrarian and ecclesiastical organisation, the anticipation of Carolingian policies by earlier rulers, a greater stress on the Roman elements in the development of feudalism, and the recognition of greater continuity of town life and money economy. To maintain so many arguments with a host of critics, and to combine so much local detail with a broad view of European development is no small triumph of skilful presentation.

The translators, Miss Beard and Mrs. Marshall, with Professor Power always at hand as consulting expert, have produced a translation which is readable, fluent, and at times lively. The interest of these and other experts has ensured the scholarly performance of a difficult task, and readers in this country will be grateful to them for making so easily accessible one of the most brilliant and original products of contemporary historical learning.

T. F. T. PLUCKNETT.

Our Trade with Britain. By P. W. BIDWELL. New York: Council on Foreign Relations. London: Royal Institute of International Affairs. 1938. 129 pp. 6s. net.

This volume is a brief but useful survey of the factors to be considered in the negotiation of a reciprocal trade treaty between the United States and the United Kingdom. The work of a representative group of American economists and men of affairs, it is a study parallel with *Anglo-American Trade Relations*, issued by the Royal Institute of International Affairs. After analysing the nature of the trade between the two countries and the extent to which it is complicated by triangular exchanges with the Dominions and the Colonial Empire, there is a candid review of American commercial policy in the post-war period. The Hawley-Smoot tariff of 1930 is characterised as "a monumental blunder. For by this action the United States not only took a step opposed to its own interests as one of the world's greatest creditor nations, but it also set in motion a train of events which resulted disastrously for world trade in general." The recent reciprocal trade agreements, it is concluded, have not "done more than modify slightly the rigorous protectionism of the Hawley-Smoot tariff".

On the other hand the great damage done by British protectionism to international trade in general and more particularly to American imports, especially of agricultural commodities, is clearly set forth. Of the three lines of protective legislation introduced in 1931-2—the adoption of a general tariff, the extension of preferential treatment to the Dominions and the closing of the open door in the colonial empire—greatest importance is rightly attached to the first. The consolidation of the tariff, the special importance of the commitments entered into with respect to the protection of British agriculture and preference to Dominion agricultural imports, the greater stress on bilateralism in the British as distinct from the American reciprocal trade treaties and the damage done to American trade in certain colonial areas, are clearly brought out. The latter forms an effective reply to the articles recently contributed by Sir George Schuster to *The Times*, which offered statistical evidence purporting to show that colonial preference had not greatly injured foreign trading interests. If the statistics proved anything it was that protection is able to modify natural trade currents only at great cost and with difficulty;

but in fact damage has been done both by diverting trade from foreign to British sources at higher costs and by providing foreign countries with clear reasons for undertaking more positive national policies in other areas. One need only talk with almost any Japanese to discover that the heightened consciousness of being hemmed in by migration and tariff barriers is a real factor in the formation of imperialist policies. British imperialism, reverting to "that baleful spirit of commerce that would govern a great empire by the maxims of the Counter" may not have gained much, but it has provided an excellent text for other imperialisms. The American possessions, it must be said, are even more closely preserved for American trade and shipping. The final chapter of Professor Bidwell's book considers the prospects of an agreement such as is now being negotiated. The political as well as the solid economic advantages of such an agreement are obvious, but protectionism is well entrenched in both countries and the negotiations are rendered more laborious by the preferential systems embracing the Dominions and the Colonies. The typical and important case is cited of "Raw wool and woollens, the famous Schedule K of the Payne-Aldrich tariff . . . , the bloody angle around which great tariff battles have been fought". In the present negotiations these duties seem likely once again to deserve the favourite Australian adjective. British manufacturers would like the duties on cloth reduced, Australian wool-growers and American manufacturers agree that the duties on the raw material should come down; but American wool-growers demur and British manufacturers seem ready to aid them by asking for additional reductions in the cloth duties if raw wool is freed of some of its burdens. Here is a clear clash of group rather than national interests. To an economist there seems an over-riding principle that the forgotten consumer's interest would benefit by both sets of reductions enabling production to be specialised in the most favourable areas; but in fact the decision is likely to be a bargain between organised interests and the consumer is unfortunately not organised. Some agreement will doubtless be made and its benefits will not be negligible; but they are unhappily not likely to be as substantial as they might be, to the advantage of all but a few solidly organised immediate interests.

J. B. CONDLIFFE.

Tariff Levels and the Economic Unity of Europe. By H. LIEPMANN.
London: George Allen & Unwin. 1938. 424 pp. 21s.

Dr. Liepmann has written a thorough and painstaking study in continuation of the League's attempt to measure the relative height of tariff levels in various countries. It is a laborious and ungrateful task. The method of measurement adopted is to calculate "a magnitude which is equal to the average of the percentages which the duties imposed by any tariff (or group of duties of a tariff) constitute

of the values of the commodities subjected to that tariff (or group of duties)". Necessarily selection has to be made of certain types of commodities which can be regarded as representative for the purpose in hand. Dr. Liepmann is concerned with measuring the tariff level imposed on "the principal European export goods in the fifteen most important European importing countries." To get a basis of comparison he must take a fictitious bundle of goods and therefore he designates his results as "potential tariff levels". He is quite cognisant of the limitations of his methods and fully aware also of the defects of the statistical materials he is working upon.

One can but congratulate him upon the achievement of a long and arduous study involving very laborious statistical work carried through to completion by individual effort. His main results are a series of measurements for 1927 and 1931 (to which he adds for comparison 1913) which, with all necessary qualifications, give a vivid picture of the strengthening of tariffs in the principal European countries after the failure of the attempts at a tariff truce. Each of the countries dealt with is studied in detail, and account is taken throughout of the differential treatment of foodstuffs, raw materials and manufactured articles.

Generally speaking the reinforcement of tariff restrictions has been most significant in the agricultural field; but there has been a marked stiffening of tariff rates all round. The general "potential tariff levels" rose markedly between 1927 and 1931 in all the fifteen countries considered. Only in Sweden and Poland were the levels of 1931 below those of 1913 and in most countries they were at least twice (in Bulgaria four times) as high.

Dr. Liepmann has done an excellent and careful piece of statistical measurement that will remain an indispensable work of reference. His story ends in 1931. After that year tariffs continued to increase, but a complicated apparatus of new restrictive devices in the shape of quantitative regulations and exchange restrictions would make the measurement of tariff levels alone a misleading indication of the obstacles to international trade. Further work on this subject involves complicated analyses of the working of these new forms of trade regulation which, so far from disappearing, are being consolidated into permanent mechanisms.

J. B. CONDLIFFE.

Adam Smith as Student and Professor. With unpublished documents, including parts of the "Edinburgh Lectures", a draft of the *Wealth of Nations*, extracts from the Muniments of the University of Glasgow and correspondence. By WILLIAM ROBERT SCOTT. Glasgow University Publications XLVI. Glasgow: Jackson, Son & Company. 1937. xxiv + 445 pp.

Professor Scott's long devotion to the cause of Adam Smith has been richly rewarded. In this splendidly produced volume of the

University of Glasgow publications an immense wealth of hitherto unknown information on the first forty years of Smith's life is laid before the reader. For this period, that is till Smith's visit to France, Professor Scott gives us in the first part of the volume a connected but by no means complete narrative, since he confines himself essentially to the new information which he has obtained. This account of part of the life of Smith fills, however, only little more than a fourth of the volume. The remainder reproduces a vast mass of documents, mainly connected with Smith's professorship in Glasgow, a considerable number of letters, including nearly fifty unpublished letters by Smith himself, a reprint of the already famous "Early Draft of the Wealth of Nations," the discovery of which was announced by Professor Scott some while ago, 31 pages of facsimile reproductions of various handwritings, and a number of appendices.

But although it was Professor Scott's deliberate choice to give us a full and critical presentation of all the new material he has found, rather than a revised account of the whole life of Adam Smith, it is probable that the majority of readers will regret this decision. As it is now before us, Professor Scott's presentation presupposes an intimate acquaintance with the life of Adam Smith as described by Rae. And it can hardly be said that he gives his readers much help in assimilating the fruits of his painstaking research. Indeed, if he had deliberately wanted to make his readers experience all the joys of discovery of important facts after long search among less important details, he could hardly have succeeded better. One has to learn one's way about this volume before one can really appreciate its rich contents. The exciting announcement in the course of the introductory narrative of the discovery of a letter in which Smith gives an account of his studies after his return from France till he was settled as a Commissioner of Customs (p. 57) sends one hunting among the letters till one finds one (No. XLVII, p. 281) which approximately corresponds to that description, and is presumably the one referred to. And the even more interesting reference on the same page to "fifteen folio pages, most of which represent very early work" and which in part apparently reproduce some of the economic sections of the Edinburgh lectures, start one on another search till one discovers that only part of them has been reproduced, and that in a much reduced facsimile which makes exceedingly difficult reading. A few more cross-references would have been very helpful.

About the importance of the "Early Draft of the Wealth of Nations", and also of the newly discovered part of the Edinburgh lectures there can be no doubt. Professor Scott is now inclined to date the former in the summer of 1763, that is after the session in which the recorded Glasgow lectures were given, and before Smith departed for France, while the latter belongs to 1755. Together with the notes of the Glasgow lectures they give us a surprisingly complete picture of the

development of Adam Smith's thought on economics, and correct some of the traditional views, particularly as regards the supposed influence of the physiocrats.

There are only one or two points of detail where one might perhaps question Professor Scott's statements. The conversion of Mirabeau to the Physiocratic doctrine occurred in 1757 and not in 1758-9 as stated in the footnote on p. 125. The statement on p. 119 that the French author to whom Ferguson admitted indebtedness, and where "Adam Smith had been before him", was "no doubt Montesquieu", sounds somewhat too apodictic after Mr. H. V. Roberts' plausible suggestion that it may have been Boisguilbert (*Boisguilbert*, Economist of the Reign of Louis XIV, 1935, p. 327). And why does Professor Scott keep from us the titles of the books, even if they are few, which the manuscript catalogue of Smith's library of the year 1781 adds to Dr. Bonar's catalogue, now he has succeeded in obtaining a photographic copy from Tokyo? Such a list would surely have been more important than the facsimile reproduction of the title and one other page.

Great as the amount of information in this volume is, it does not include all the material Professor Scott has unearthed. Occasional references to articles published by him in recent years (particularly the one on "Adam Smith at Downing Street" in *Economic History Review*, Vol. VI) show that there is a good deal more, for which one has to go to various periodicals. Indeed one greatly misses a systematic bibliography, not only of Professor Scott's own writings on the subject, but also of the numerous other writings which, as he himself says, have each contributed its mite of detail to the general picture of Adam Smith. It seems that at least one of the more important of these contributions, Professor J. Jastrow's article on the occasion of the first announcement of Professor Scott's discovery of the "Early Draft of the Wealth of Nations" (*Zeitschrift für Nationalökonomie*, Vol. VIII), in which Professor Jastrow makes some interesting suggestions on the significance of this find, has actually escaped Professor Scott's notice.

It is in the nature of a publication of historical documents that their significance cannot be adequately explained except by re-writing the history of the subject with which they deal. This is evidently not possible within the compass of a short review. May we hope that Professor Scott will not consider us ungrateful if we insist on regarding this volume as an interim report, and continue to wait for the revised survey of the whole life of Adam Smith which he better than anybody else could give us, and which, now that he has satisfied his exacting standards for the presentation of historical sources, his conscience may allow him to do in a lighter manner.

Planned Society. Yesterday, To-day, To-morrow. A Symposium by thirty-five Economists, Sociologists and Statesmen. Edited by FINDLAY MACKENZIE. With a Foreword by Lewis Mumford. New York: Prentice Hall Inc. 1937. xxvii + 989 pp. \$5.00.

This imposing tome, described on the title page as a "Symposium" by thirty-five authors, consists, to the extent of almost exactly one-half of the separate articles contained in it, of reprints from other publications, while the other half appear to have been written specially for the occasion. The authors of the first group range from Stalin and Mussolini to Professors Gustav Cassel and Sidney Hook, while the original contributions also come from authors holding as diametrically opposed views as do Professor H. Gideonse and Mr. George Soule. The only sort of homogeneity one can expect from a volume of this kind is that the individual contributions make consistently interesting reading, and this has on the whole been achieved, although the omission of a few articles might have saved the reader who only dips into the volume from drawing one of the few blanks.

The work deals less with the technique than with the tasks and consequences of economic planning. The greater part of it, after two historical sections, is divided into a group of articles dealing with planning in particular areas of economic activity and a group discussing the planning of all economic activity. The contributions in the first group are highly informative, but particularly varied in character and quality, ranging from highly expert discussions of the general principles of monetary policy to discussions of the details of town planning and the regulation of particular industries. In the second group the discussion of the economics of planning is probably the least satisfactory part. Considerable space is devoted to a survey of the cultural effects of planning, and it is interesting to observe how much all the authors are concerned about the compatibility of planning with freedom and democracy. Whether this finds expression in outright scepticism on this point, or whether it leads the authors to reassert again and again that the two things are compatible without any attempt to show how this is to be achieved, it is at any rate clear that this begins to be recognised as the central problem. One cannot help wondering, however, whether Dr. Mitrany is not somewhat too optimistic when he warns us "that, within a generation, the 'planners' and all their works will be swept away by a violent revulsion of feeling if the material stability they promise has to be bought at the price of intellectual and spiritual oppression".

The Editor has not taken his task easily and, in addition to a general introduction and short introductory notes to every essay, he has provided the reader with an ample and useful bibliography and short biographies of the individual contributors. It was evidently a labour of love, but one wonders whether the faith in planning which led him to undertake it has not been somewhat shaken in the course of his work. At any rate, it is hardly consistent with much faith

in planning that he predicts that "War would disrupt a planned society even more completely than a society in which free enterprise would make immediate and continuous adjustments to the needs of war." This admission might well serve as a warning to those who seek to make the necessity of preparation for defence a new argument for further extending the planned sector of economic life.

F. A. HAYEK.

Bibliography of the Collection of Books and Tracts on Commerce, Currency and Poor Law. (1557 to 1763.) Formed by JOSEPH MASSIE. Transcribed from Lansdowne Manuscript MXLIX with Historical and Bibliographical Introduction by WILLIAM A. SHAW. George Harding's Bookshop Limited. London. 1937. xl + 173 pp. 15s.

The reproduction in print of Joseph Massie's catalogue of *Commercial Books and Pamphlets* has long been a *desideratum* of all those interested in the early history of economics. It is still, as Professor Hollander described it twenty-five years ago, "the most helpful guide to the English economic literature before Adam Smith". Mr. Henry Higg's *Bibliography of Economics 1750-1775* supersedes it only for the first twelve or fourteen years of this latter period. But little more than a fifth of the items in Massie's catalogue, which begins in 1557, falls into this period, and the great bulk of it covers the period 1650-1750.

The present edition is well produced and reasonably priced. Unfortunately the editing is not equally satisfactory. Mr. Shaw has added a short introduction and a list of Massie's publications. In the introduction it is said of Massie's collection of books that "we know, or feel certain, that it remained in his own possession until at least December, 1764, for that is the date of the final loving note he inscribed in the catalogue". In fact a pencil note in Massie's own hand on the inside of the cover of the manuscript (but not here reproduced) says: "Novr. 1760. Sold the Whole Collection excepting those under Five Heads—viz., Duplicates—Tables—Abs[tracts] of Laws—Single Acts—Treaties". We know from another reference to this collection in one of Massie's pamphlets that it contained about 1,500 books and pamphlets, while the present list contains 2,377 items. But although it is clear from this that Massie just continued to add to the list whatever new titles of books he learnt about, it is constantly referred to here, even in the title of the present publication, as if it were the catalogue of Massie's own library.

No formal collation of the manuscript is given. If it were, it would be at once obvious that the Editor has left out some valuable features of the original, particularly the very useful "References to classical [i.e., classified] index" under "General" and "Particular Heads"

(e.g., "Manuf., Wool") which apparently were to be used for a separate subject index which, if ever compiled, has at least not been preserved. But the subject headings given in the chronological list often provide exceedingly useful information not to be derived from its short or abridged title. There is also in the original manuscript a convenient table giving all duplicates (115 items, some in three or four copies and partly in different editions listed under different dates) and a system of cross references between this table and the main list which has not been reproduced. There are still further useful notes by Massie which have been omitted by the Editor. And although the Editor says that where he has been able to give the real author's name he has inserted them in square brackets, he has not done so in the numerous cases where Massie himself gives the author, not in the chronological list it is true, but in the alphabetical authors' index.

On p. 142, at the end of the chronological list, there occurs the following misleading note:

"Between Nos. 4326 and 4327 there is the following entry in red ink—

18 Dec., 1764. *Total number of entries in this index is 2377, of which * were in the first index 1672.*

* This space is blank in the original manuscript."

There is no blank in the original manuscript at the point indicated by the asterisk (but a dash between the figure "2377" and the word "of") and the number of entries in the first index was therefore 1672, which in the form in which the passage is now quoted looks like a misprint for the year in which that earlier index was compiled.

While useful as a check-list, the present edition can hardly serve in place of the original for more serious work. Nor are the defects of the editing compensated for by the notes added by the Editor to the list of Massie's works. One of these notes, for instance, says that the Essay on the Natural Rate of Interest "has been praised on the ground that it preceded or ante-dated Hume's Essay on Interest. There would not be much credit in such an achievement, seeing that Hume's Essay is meaningless and valueless, whether as economics or as sociological history."

F. A. HAYEK.

An Abstract of A Treatise of Human Nature. 1740. A Pamphlet hitherto unknown by DAVID HUME. Reprinted with an Introduction by J. M. Keynes and P. Sraffa. Cambridge (at the University Press). 1938. xxxii + 32 pp. 3s. 6d.

This Abstract of Hume's Treatise, published anonymously in 1740 but apparently unnoticed then and now forgotten for near two hundred years, is, as Messrs. Keynes and Sraffa convincingly argue in the Introduction, a work of David Hume himself. In his disappointment

about the poor reception of the Treatise he apparently decided to give it a "puff" by reviewing it himself. That in doing so he could not resist the temptation to suggest improvements which he only introduced in Volume III of the Treatise, which appeared some months after the pamphlet, gives him away beyond doubt to the modern student. When the Abstract proved to be even less successful than the original, Hume seems to have successfully hushed up the whole affair. The only reference to the pamphlet in his correspondence has been misinterpreted and has given rise to the legend that Adam Smith at the age of 17 had prepared an abstract of the Treatise for his teacher Hutcheson, who had sent it on to Hume who in turn attempted to have it printed. It seems now clear that there is no reason to assume that Hume and Smith met earlier than about 1750, and the Mr. Smith mentioned in Hume's letter to Hutcheson appears to have been a Dublin bookseller, whom Hume had approached to get the Treatise reprinted in evasion of the English law of copyright, and at the same time to publish the Abstract.

F. A. HAYEK.

Consumers' Credits and Unemployment. By J. E. Meade. Oxford University Press. 1938. 115 pp. 5s.

In this stimulating little book Mr. Meade joins the growing number of economists who have published suggestions for government action to palliate the severity of cyclical depressions. Mr. Meade's suggestions differ from most others in that he does not attempt to deal with the problem directly by plans for the stimulation of the demand for capital goods, but merely seeks to check the cumulative effect of the downward spiral by placing additional purchasing power directly into the hands of the great mass of consumers. He thus hopes to obtain the advantages claimed by the advocates of higher wages as a cure for depressions without the attendant difficulties caused by a rise in costs of production.

Mr. Meade is not blind to the difficulties of his own plan, one of the chief of which is that any reduction which it might effect in the amplitude of fluctuations in industrial activity would be obtained at the expense of increasing the amplitude of the fluctuations in the level of real wages. In periods of falling prices, when real incomes are rising, the rise would be stimulated by an increase in money incomes; while in periods of rising prices the grants to consumers would be discontinued and the fall in real wages magnified. It is easy to foresee the industrial and political frictions which would arise in periods of trade recovery. While, however, Mr. Meade appreciates this difficulty, he does not mention the more plausible alternative (put forward by Mr. N. Kaldor in the December, 1936, issue of the *Journal of Political Economy*), of paying the government subsidies, not to consumers, but to employers of labour in proportion to their wage bills. This scheme would operate

much more directly on the level of employment and would avoid some at least of the difficulties inherent in Mr. Meade's plan.

Mr. Meade also gets into difficulties with his suggestions for financing the scheme. He envisages starting it in a time of depression, and proposes that the government should finance it by issuing a special sort of additional currency. This would be exactly equivalent to cash so long as it remained in circulation, but, since he does not want it to become the basis for an enormous expansion of bank credit, would become interest-free treasury bills as soon as it came into the hands of the banks. These would be provided only with enough additional cash to enable them to hold the new bills, and would be paid only out-of-pocket expenses. This scheme is very complicated and of doubtful practicability, if only for the reason that much of the new money would remain in circulation and so set free a large amount of existing money to swell the cash reserves of the banks, thus providing a basis for the undesired expansion of credit. Mr. Meade would have avoided most of these difficulties if he had followed the suggestion of Professor Robbins (*Lloyds Bank Ltd. Monthly Review*, May, 1937) and started his scheme in a time of boom. The government could then accumulate reserves of gold (or possibly balances with the joint stock banks) which could be used to finance Mr. Meade's (or Mr. Kaldor's) subsidies during the ensuing depression. Whether, however, any body of politicians can safely be entrusted faithfully to carry out even the most promising of such schemes is a question which neither Mr. Meade nor any other economist can answer.

F. W. PAISH.

Umriss einer Geschichte der Preise und Löhne in Deutschland vom ausgehenden Mittelalter bis zum Beginn des neunzehnten Jahrhunderts. By M. J. ELSAS. Erster Band. Leiden, A. W. Sijthoff's Uitgeversmaatschappij N.V. 1936. x + 808 pp. Fl. 14.

Materialien zur Geschichte der Preise und Löhne in Österreich. Band I. By Rudolf Geyer und Franz Koran. Edited by ALFRED FRANCIS PRIBRAM. Carl Ueberreuters Verlag, Vienna, IX. 1938. xxviii + 879 pp., diagrams.

These two volumes are of particular interest as belonging to the first batch of publications resulting from the extensive work carried out on behalf of the International Committee on Price History, headed by Sir William Beveridge. Great latitude has been given the authors of each particular investigation, and both similarities and dissimilarities between the two volumes now before us, covering closely connected subjects, are illuminating.

The volumes agree in attempting to give the readers the authentic facts, as disclosed by the sources, instead of interpretations put upon them by the investigators themselves. Both therefore give figures

for prices and wages in the currencies in which they were paid, and for the weights and measures for which they were paid. It is true that even in this case something has disappeared, as of course not every single transaction can have been recorded. The annual figures given are weighted averages for Austria, but unweighted for Germany; I expect most scholars to prefer the first-named method. But with regard to Germany there are also quarterly figures in great amount, and also frequently maximum and minimum figures within the years. No general index number is to be found in either volume, nor is there any attempt at computing figures for the countries or even cities as entities; each source is treated separately throughout. All this is a great boon, at least in its positive part; it means a great improvement over most previous contributions to price history.

Upon further study, however, the treatment of the two authors shows a remarkable divergence. Professor Pribram, for Austria, gives extensive tables showing both the silver value of decennial averages of each particular price and also index numbers for them, on the basis of the period of 1720-45. Dr. Elsas, on the other hand, confines himself to giving tables of the silver or gold content of the respective currencies, declining to publish tables for any prices in silver or gold. The nearest approach to tables for these are two diagrams, for rye in Munich and Augsburg respectively, containing one curve for original prices and another for prices in gold or silver. Neither does Dr. Elsas give general tables of index figures, though in this case his text contains very valuable small tables for prices at the end of each period, on the basis of those at the beginning of the period, and also the total change between 1500 and 1800 or 1820. In contrast to Professor Pribram, Dr. Elsas also briefly but very illuminatingly discusses his own general conclusions from his materials.

Personally, I should have preferred to have in both volumes the two features now to be found only one in each. It is, I think, asking too much of a reader to compute the silver (or gold) value of each price series himself; and a great saving of time would follow from having the work done once for all. While admitting unreservedly that prices in the actual currencies of the times are the principal thing for most purposes and should never be omitted, I think Dr. Elsas underestimates the part played, even for contemporaries, by prices in silver under conditions of frequent, not to say normal, monetary confusion. On the other hand, I think Dr. Elsas has the advantage over Professor Pribram in presenting conclusions; for a scholar who has busied himself for years with a certain group of materials is certainly, *ceteris paribus*, more able to interpret them correctly than is the average reader. Professor Pribram would, I think, have found ample room for conclusions by cutting down considerably his lengthy chapter (by one of his assistants) on monetary history, which is not very closely connected with the main subject.

Both volumes are geographically very restricted. The German

covers nothing outside the three South German cities, Munich, Augsburg and Würzburg; the Austrian one is nominally a little more extensive, but all the important series are confined to Vienna and its immediate environs. The sources are mostly of the same character in both volumes, principally hospital and monastery accounts, to which are added municipal accounts for Munich and Würzburg; for a later period market quotations occur in both volumes. Both authors rightly stress the supreme importance of homogeneous series covering long stretches of time and have been remarkably successful in securing them. Some few of the German series go back to the years around 1400, and a not inconsiderable number goes back to 1460; almost all are carried on to 1820 or (for Würzburg) 1800. The Austrian series are mostly of the same age, but break off before the end of the eighteenth century. Especially in the German volume the space between the beginning and end of a series for each commodity, as well as the number of years represented in it, is detailed with great care.

About the labour profitably spent in the investigations preceding these volumes there can only be one opinion. Especially the more than 300 pages of explanations to the different items in Dr. Elsas' volume are full of information upon a number of subjects connected with the life and work of South Germany for many centuries. In this section are also incorporated a number of smaller tables for commodities not fitting into the general table, and all tables of wages have been put there. Professor Pribram is much more brief in his explanations; but it is easier to find one's way through his book, on account of an ingenious numbering of the items. Like most German books, however, both volumes sadly lack an alphabetical index.

Coming at last to the conclusions following from this enormous mass of material, it is unfortunately impossible to be very optimistic. It is true that Dr. Elsas gives a series of clear-cut conclusions. He rightly finds a remarkable conformity between the three towns he has investigated. For the period 1460-1500 he somewhat tentatively deduces a rise in prices. The rise between 1500 and 1620 is, of course, the most pronounced and best-known feature; it is estimated to have increased the trend prices of cereals between four and eight times (in Munich), while maximum and minimum figures are even more widely apart. The rise in industrial products has been less pronounced. The next half-century shows a remarkable fall, with regard to agricultural produce taking away at least half the previous rise; it was followed by a new rise, bringing up prices around 1800 to a point mostly above that of the 1620's. Quite simple, but for that very reason remarkably effective, small diagrams—besides the more refined ones, giving developments in greater detail—show these results at a glance. All this refers to prices in the currencies of the time. The two diagrams giving also prices in gold or silver, for rye in Munich and Augsburg, show the rise in the sixteenth century and

the subsequent fall almost to the same extent, but hardly any new rise before the 1790's.

Now, the surprising result is that the Austrian figures bear this out only to a very limited extent. The rise 1520-1620 shows very clearly there too, it is true, but not the subsequent fall, or at least not at all to the same extent. Among cereals, only oats show any fall at all between 1625-30 and 1660-70, either in currency or in silver; no general fall occurs earlier than in the 1670's. This difference in purchasing power, not only in different, local currencies but also in silver, between places not very distant, is certainly curious and so far entirely unexplained. The discrepancies between the figures in the two volumes is considerable throughout. Thus, e.g., Dr. Elsas states that meat rose more steeply than cereals between 1500 and the beginning of the nineteenth century, and his figures bear him out; but the Austrian figures, though not strictly comparable, not only show nothing of this but even point to an opposite conclusion. Dr. Elsas finds no difference between prices for large and small amounts, whereas Professor Pribram distinctly states that this does not hold good with regard to his figures. Several other instances of the same disagreement could be given.

My own practical conclusion from this may be unpalatable to many. It is that the time has now come for synthesis, for pooling results, for mapping out what we know. The idea upon which these volumes are based is a counsel of perfection; and it would take many decades to have a sufficiently large field—sufficiently large, that is, for formulating general conclusions—treated in the same way. But life is short, and the life accorded to independent research and scholarship, outside technology used for purposes of destruction, may be shorter still. I think it eminently desirable that much more imperfect materials than those before us now should be brought together for great areas and co-ordinated without delay, so that attempts could be made to reach conclusions however tentative. The volumes now before us will, I think, enable scholars, working much less thoroughly upon much less reliable materials, to come to more reliable conclusions than would have been possible without them.

ELI F. HECKSCHER.

Investigations into the Margins between Producers' and Consumers' Prices of Certain Foodstuffs. No. I of Contributions to the Study of the Problem of Nutrition, published by the International Institute of Agriculture. Rome. 1937. 101 pp. No price stated.

In September, 1935, the General Assembly of the League of Nations set up the Mixed Committee on the Problem of Nutrition and the International Institute of Agriculture was invited to co-operate in the study of the formation of retail prices of the principal foodstuffs.

In its first report the Institute examines the processing and distribution costs of the principal foodstuffs in twelve countries. The available statistical material relating to price spreads and the information obtained specially for this investigation are summarised, together with an interpretation, in Part II, which forms the main body of the report. The countries covered are Austria, Canada, Denmark, Finland, France, Germany, the Netherlands, Norway, Poland, Switzerland, the United Kingdom and the United States. Part I consists of a short theoretical analysis of the structure of distribution costs and of the conditions in which these costs can be said to be excessive. It should help to dispel many of the erroneous and over-simplified views held about distribution costs.

The general conclusion of Part I appears to be that the main cause of excessive distribution costs is monopolistic action by associations of traders often supported by legislation. Yet the report reproduces with approval the argument that competition in the distribution of certain foodstuffs, such as milk, will lead to overlapping and an "excessive" number of retailers serving the same street. Where minimum retail prices of milk are fixed by law, as they are in Great Britain, one would expect competition to lead to an excessive number of retailers. In its recent report on costs of retail milk distribution the Food Council concluded that if retail prices were freed from control competition would, in fact, lead to lower prices and a reduction in the number of distributors; and the 1936 Milk Reorganisation Commission believed that if they were free to do so some distributors would tend to reduce prices at the cost of those services which are now the only form of competition left open to them. The acceptance of the view that it is imperfect price competition rather than its legal restriction which is mainly responsible for "excessive" overlapping has led the Institute to the conclusion that "an agreement among retailers to divide a given area amongst themselves—not of course supplemented by an agreement to maintain prices—could not fail in many cases substantially to reduce costs". Costs would almost certainly be reduced, but is it certain that the commodity and the service would be considered to be the same by consumers? Is a restriction of numbers likely to *reduce* the imperfection of competition which alone can be responsible for "excessive" overlapping? There can surely be little doubt that the wastes of free imperfect competition in retail milk distribution are very much less than the wastes resulting from the imposition of legal restrictions on price cutting.

R. F. FOWLER.

The Economy of Britain: A History. By H. M. Croome and R. J. Hammond. Christophers. 1938. xx + 327 pp. 8s. 6d.

Mrs. Croome and Mr. Hammond are to be congratulated on *The Economy of Britain: A History*. As they acknowledge in their preface

"to cover in three hundred pages the thousand years of British economic development, neglecting nothing significant at any stage, is physically impossible"; but within the limits of their available space they have produced a very interesting piece of work. "History," says Sir William Beveridge in his foreword, "should be a study of the present descended from and explained by the past, or of the past living on and explaining the present". Most people, however keenly they may be interested in modern economic and social problems, have neither the time nor the training to make an independent study of the past and so often fail to understand the present. In providing for the needs of such readers Mrs. Croome and Mr. Hammond have done a real service. *The Economy of Britain* is more than a mere text book survey of as many relevant facts as can be crowded into its pages, it is a stimulating narrative, clearly and even excitingly presented. In it the general reader, with no previous knowledge of economics or economic history, will find even technical problems so clearly stated, in terms so refreshingly free from what the ordinary man considers "professional jargon," as to cause no difficulties. To such readers the inevitable distortion due to compression will be unimportant, though the specialist will agree with the authors that generalisations such as "the mobility of labour was severely hindered" by the Act of Settlement or that the birthrate rose enormously under the stimulus of the Speenhamland system are indeed "introductory first approximations". To tell historical truth and be brief is, however, notoriously difficult and in the main the authors are to be congratulated on the way in which they have woven the latest results of academic research into their narrative.

As an introduction both to economics and to economic history this book should be very useful to undergraduate students. The illustrative detail is managed with such skill as never to obscure the wood for the trees and rarely to lead through an arid desert, so that an interesting, as well as a clear, view of the scope of the subject is easily obtained. Of particular value is the stress which the authors place on the interconnection of political events and constitutional machinery with social and economic development. Economic history is never allowed to develop in a vacuum, divorced from the realities of national life. "A nation of nomads has no use at all for a highly centralised Government. It needs a leader in time of war and a source of law and order in time of peace, but otherwise each little group can get along on its own. A nation of peasants on little self-sufficing holdings, in a country where towns are small and few and trade negligible, where people come into contact with one another either simply and directly or not at all, does not need much more." It is with the description of a community of this kind that Mr. Hammond begins his examination of the economy of Britain, taking as his theme the diversity of mediæval agrarian organisation shaped by geography and the different social heritage of invading tribes. Gradually the story of growing economic

unity is unfolded until in the later chapters Mrs. Croome explains the rise of modern combines and examines the way in which "More and more, from the 'seventies to the Great War, economic power was being concentrated in a few hands by industrial combination". And at every stage, though through lack of space often a hint or an allusion must serve, this development is related to political and constitutional factors. In the same way British development is surveyed against the background of first European and then World events and the reader is never allowed to forget that modern Britain is but part of a larger whole.

The co-operation of economist and economic historian, though often advocated, is rarely seen. *The Economy of Britain* is a very happy example of what such collaboration can achieve. The treatment of the history of the last seventy years gains much from Mrs. Croome's training as an economist. Big business and combines and the influence of finance are not only clearly explained but they are presented as a whole and the reasons for their genesis are so lucidly given that the reader no longer has any excuse for the feeling that modern economic life is a jungle which he cannot penetrate. Her presentation too of those factors which led to the Industrial Revolution is equally reasonably persuasive, though in the handling of the actual technical changes and in the examination of the tariff alterations that followed she could with advantage have been more ruthless in abandoning some of her detail. The function of such a book as this is to sketch an outline not to fill it in and the figures for the sliding scale of the Corn Laws or the technical details of metallurgical inventions, if they are to be mastered at all, must be read in more specialised books. It is also a weakness, that apart from a very clear time chart of economic development, there is so little, beyond a reference to Cunningham and Lipson, to help the student to pursue the subject further. In the case of undergraduate readers this is no great loss, for they have sources of additional information easily open to them but in the case of the general reader this may not be the case. Also Lipson's last volumes only cover the Age of Mercantalism and after this, for what is perhaps the most difficult period for the undirected student, there is no guidance given.

In spite, however, of any minor criticism on questions of detail *The Economy of Britain* is a book which can be unhesitatingly recommended to those readers for whom it was written. Both the general non-academic public wishing to have some knowledge of the historical background of modern economic problems and the undergraduate, requiring a stimulating introduction to the subject and later a useful summary of it, when that introduction has been followed by wider and more specialised reading, will have good cause to be grateful to Mrs. Croome and Mr. Hammond.

DOROTHY MARSHALL.

Recent Important Foreign Books on Economics

The Librarian of the British Library of Political and Economic Science has made arrangements, as a supplementary check to the purchases of the Library, to receive regularly every quarter from competent foreign scholars lists of the most important books in their respective fields of study published in their own countries (or languages as the case may be) during the preceding three months. It appeared to the Editorial Board of *ECONOMICA* that these lists might prove useful to other institutions, and the lists of books on economics will therefore be published regularly in future issues of *ECONOMICA*. It must be understood, however, that the Editorial Board of *ECONOMICA* accepts no responsibility for the selection of the books included in the list.

AMERICAN BOOKS

(Selected by Professor H. Gideonse).

MARGET, ARTHUR WILLIAM: *The Theory of Prices: A Re-Examination of the Central Problems of Monetary Theory*. Vol. I. New York. xxv, 624 pp.

MILLIS, HARRY ALVIN, and MONTGOMERY, R. E.: *The Economics of Labor*. Vol. I. Labor's Progress and Some Basic Labor Problems. Vol. II. Labor's Risk and Social Insurance. Vol. III (in preparation). Organized Labor. New York. 543 and 427 pp.

SCHULTZ, HENRY: *The Theory and Measurement of Demand*. Chicago. 850 pp.

FRENCH BOOKS

(Selected by Professor C. Rist).

PERROUX, FRANÇOIS: *Syndicalisme et capitalisme*. Paris.

SAUVY, ALFRED: *Essai sur la conjoncture et la prévision économiques*. Paris. 191 pp.

No German Books.

ITALIAN BOOKS

(Selected by Professor Luigi Einaudi).

FANFANI, AMINTORE, ed.: "L'Economia Italiana nel 1937," in *Rivista Internazionale di Scienze Sociali*, Maggio, 1938. Milan.

ULISSE, GOBBI: "L'Assicurazione in Generale," in *Annali di Economia*, vol. 13, no. 1. Padua.

Books Received

- ALLEN, G. C. : *Japan : The Hungry Guest*. George Allen and Unwin. 1938. 261 pp. 10s. 6d.
- AMOS, J. E. : *The Economics of Corporate Saving*. University of Illinois Press, U.S.A. 1938. 136 pp. Paper bound \$1.50. Cloth bound \$2.00.
- ANGELL, N. : *Peace with the Dictators?* Hamish Hamilton. 1938. 328 pp. 7s. 6d.
- ASPESLAGH, F. M. : *De consumptie en, meer in 't bijzonder, het consumptiebegrip in de economische theorie*. J. Van Mierlo-Proost, Turnhout. 1938. 239 pp. Fr. 60.
- BARNES, H. E., and BECKER, H. : *Social Thought from Lore to Science*. 2 Vols. D. C. Heath and Company, Boston, U.S.A. 1938. xiv, 790, lxxxiv pp., viii, 791-1178, lxxvii pp. \$5.00, \$4.50.
- BENHAM, F. : *Economics : A General Textbook for Students*. Isaac Pitman & Sons, Ltd. 1938. xv, 488, 31 pp. 7s. 6d.
- BIDWELL, P. W. : *Our Trade with Britain*. Council on Foreign Relations, New York. The Royal Institute of International Affairs. 1938. x, 129 pp. \$1.50, 6s.
- BITTERMAN, H. J. : *State and Federal Grants-in-Aid*. Mentzer, Bush and Company, Chicago. 1938. x, 550 pp. \$4.00.
- BONN, M. J. : *The Crumbling of Empire*. George Allen and Unwin. 1938. 432 pp. 15s.
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Causes of Changes in Gold Supply¹

By F. W. PAISH

UNTIL fifty or sixty years ago there was a good deal to be said for the view that changes in the output of gold were due rather to the accidents of the discovery or exhaustion of gold deposits than to any changes in the economic data, including costs of production and the price of gold. Many of the most important discoveries of the nineteenth century seem undoubtedly to have been made as the result of pure accident, and accident seems to have played an important part in the greatest discovery of all, the Main Reef series of the Rand, though in this case, in view of the intensity of the search that was being conducted, it is doubtful if accident accelerated the discovery by more than a few months. Nor did many of the original discoveries do much to remove uncertainty. The local richness of many of the alluvial discoveries caused almost as much over-estimation of the profitability of further work in the vicinity as the strangeness of the Rand formation caused its importance at first to be under-estimated. The thousands of miners who flocked to the public alluvial diggings of California and Australia in the fifties of the last century probably earned, on the average, a good deal less than if they had stayed at home. For instance, Del Mar (*History of the Precious Metals*, p. 264), estimates that on the Californian diggings in the year 1856 the value of the gold produced per miner was under £74, a sum quite insufficient for their support in that place. Clearly, under conditions of production by a multitude of small entrepreneurs, each of whom has preferred an unknown chance of substantial wealth to the greater certainty of a modest livelihood, it is impossible to establish any reasonably approximate correlation between the value of gold produced and the value of the opportunities forgone.

¹ Paper delivered at the International Conference of Economic Services at Pontigny, France, on September 3rd, 1938.

During the last third of the nineteenth century, however, the conditions of gold mining began to change, and there can be little doubt that the major changes that have taken place in the output of gold since about 1890 have been due mainly to changes in costs of production or of the price of gold. This great change in conditions has been due largely to the fact that for many years the whole trend of development has been to reduce the uncertainties of gold mining. Some uncertainty, of course, still exists. The old adage that a miner cannot see beyond the end of his pick has not yet lost all its truth, and surprises, pleasant or unpleasant, can still occur. But it is clear that the great increases which have taken place in the knowledge of particular gold formations and of geology in general, and the immense technical improvements in methods of prospecting, of testing likely areas, of developing new mines, and of managing old ones, have eliminated many uncertainties and have converted others into measurable risks. At the same time the bulk of the world's gold has come to be produced by large, and much of it by very large, technical units, which within themselves can pool many risks and convert them into more or less calculable costs. Further, the development of mining finance companies, each interested in many different mining companies, has enabled the risks, especially of new developments, to be spread still more widely than would be possible within the individual technical units.

This reduction in the element of risk does not mean, of course, that the size and distribution of the natural deposits of gold-bearing ore are unimportant factors. Since the known and accessible deposits are limited in extent, there will necessarily be a tendency always present for output to decline unless new discoveries or lower costs intervene to check or reverse the process, while it is conceivable that the whole position might at any moment be changed by the purely accidental discovery of large and hitherto unsuspected deposits of rich ore. What is true, however, is that the power of economic forces to accelerate or delay the exhaustion of existing deposits, and to promote or discourage the discovery of new ones, is now so great that changes in the output of gold are now much less "accidental" and much more "induced" than they were half a century ago. To-day, indeed, there is no reason to assume that

the output of gold is less sensitive to changes in costs than is the output of other commodities. It is therefore possible to consider the principal causes of such changes in costs, and the conditions which determine the manner and extent of the response which output makes to them.

During the past fifty years many of the more accessible reserves of gold ore have been worked out, and during the same period there has been a great increase in the general level of prices and wages. Nevertheless the cost to-day of mining and milling a ton of ore is much lower than it was fifty years ago, and in many areas as low, or almost as low, as it was thirty years ago. If we look for the underlying cause of this achievement we shall find it mainly in the growth that has taken place in technical knowledge.

It is true that in the early part of the period much of the fall in costs in many areas was undoubtedly due to the application of increased amounts of already known forms of equipment, and above all to improved transport facilities, which gradually brought the exceedingly high price levels which formerly ruled in the vicinity of many gold mines more closely into accord with those in other parts of the world. Nevertheless, but for the various technical inventions that have been made during this period, costs of gold production in many mining areas would be several times higher than they are to-day, and the output of gold only a fraction of what it is. Probably the most important of these was the introduction in the 1890's of the cyanide process of extracting gold from refractory ore, by means of which the percentage of extraction was raised from 60 or 70 to well over 95. The effect of this increase, of the order of 50 per cent., in the amount of gold extractable from each ton of certain types of ore was two-fold. In the first place, it increased the output of gold directly, and apart from any increase in the scale of operations, by increasing the quantity of gold obtained from the existing tonnage of ore milled; and in the second place, it made it payable to mine ore of a lower gold content, and thus added to the known or potential ore reserves any ore lying between the old and the new limits of payability.

Of the three causes of changes in mining costs hitherto mentioned, two—discoveries of new supplies of ore and improved methods of production—necessarily tend to reduce costs of production, and one—the exhaustion of the more

accessible of the known ore deposits—to raise them. To these must now be added a cause which may work in either direction—changes in the supply schedules (to the gold-mining industry) of the factors required. The direction of these changes is largely influenced by the general movement of world prices, though prices of the collection of goods and services purchased by a gold mine may at times move very differently from those of the collections which are used to calculate wholesale or retail price index numbers. Until about 1909 it seems that the upward tendency of world prices which had begun in the 1890's either had little effect on gold mining costs, or was offset by other factors. From 1910 until the beginning of the war there was a slight rise in costs, especially in Australia, where its effect was to accelerate the decline in the output of gold which had begun in 1905 in consequence of the progressive exhaustion of the richest deposits. The rise in prices during, and especially just after, the war brought a very sharp rise in gold mining costs. In Australia, for instance, costs per ton of ore milled nearly doubled between 1910 and 1921, while in South Africa they rose by about 40 per cent. The smaller increase in South Africa was partly because the general rise in wholesale and retail prices between 1910 and 1920 was less in South Africa than in Australia, and partly because of the conditions, peculiar to South Africa, governing the price of unskilled and semi-skilled labour. In South Africa all mine employees except those in charge of machinery and explosives, or in positions of authority, are natives. The average native money wage is less than one-tenth of the average wage for Europeans, so that, as the ratio of native to white employees is in the neighbourhood of ten to one, the total native wage bill is rather lower than the total white wage bill, though it should be added that the natives receive food and shelter in addition. It is to this supply of cheap native labour, together with the very large local supply of very cheap coal, that the exceptionally low costs of mining in the Transvaal are principally due. Native wages are not only low, as compared with those paid to European workers, but are also much more stable. The whole work of recruiting natives is controlled by the Transvaal Chamber of Mines through two subsidiary organizations, and the labour available is apportioned among the various mines. Native wages are centrally determined,

and the mines do not compete against each other for labour.

This fixation of wages has had the effect of reducing the amplitude of fluctuations in their level. For instance, between 1913 and 1921, whereas average white wages and the cost of stores each rose by about 50 per cent., average native wages rose by only about 15 per cent., and the rise in total working costs per ton was only a little over 40 per cent. On the other hand, one result of this control of native wages is that the mines frequently complain that they cannot obtain as much native labour as they would like to employ at the wages fixed, and that, in consequence, they have been unable to work at full capacity. This tends to cause some rise in other costs per ton of ore milled, though not as great a total rise as if native wages had been determined by competition. One effect of the fixation of native wages is, therefore, that a lower grade of ore can be milled profitably than if wages had been free to move, but that the tonnage of ore milled is smaller than if the mines were free to attract more labour by raising wages. Thus the amount of ore worth milling is increased, but the number of tons milled a year, and probably also the average grade of ore milled, are reduced. The annual output of gold is therefore lower, but the lives of the mines are more than proportionately lengthened.

In the short period, the supply of native labour to the gold mines fluctuates with the demands of alternative occupations open to them, including farming in their own reserves. Good farming seasons, high prices for farm produce, increased activity in the diamond, coal or base metal mines, all tend to keep labour from the gold mines, while crop failures and lower prices tend to improve the labour supply. It is through this indirect effect of price changes that the South African gold mines most rapidly feel the benefits of a fall in the prices of other commodities, for white wages are difficult to reduce, and most mine stores are bought on long contracts and reflect price changes only slowly.

As a result partly of the control of native wage rates, partly of the reduction of white wages after the strike of 1922, and partly of the continual improvements in mining technique, gold mining costs in South Africa had fallen by 1926 to only about 6 per cent. above the 1913 level, although wholesale prices were still about 20 per cent. above the

pre-war level. This may be contrasted with the experience of Australia, where costs of production in 1926 were still something like 40 per cent. above the pre-war level. It is to South Africa's remarkable success in reducing costs that the continued rise in her gold output must be attributed at a time when production in most other countries continued to decline and in Australia, the world's largest producer in 1903, it had become insignificant.

Since the beginning of the depression in 1929 gold producers have benefited in two ways. In the early part of the depression the fall in the prices of other commodities increased the supply of available factors and brought both some fall in costs of production and, in South Africa, an ample supply of native labour. Later, as one producing country after another left the gold standard, the price of gold increased.

Hitherto we have been discussing causes of changes in gold-mining costs. We must now consider both the relationship between changes in costs of production or in the price of gold and changes in output. As we have seen, a change in the cost of producing gold may take two forms. It may take the form of a change in the amount or value of the yield of gold from each ton of ore of a given grade, or it may take the form of a change in the cost of mining and milling a ton of ore. The first will lead to an automatic change in the quantity or value of the gold produced, in addition to any indirect effect it may have via an induced change in the quantity or grade of ore milled. The second will affect the output of gold only through its influence on the quantity or grade of ore milled. It is to this indirect effect that we must now give our attention.

The relationship between the size of a given deposit of ore and the amount of that ore which is milled in any one year, is exceedingly complicated. Here it is possible to give only a broad outline of the principal considerations involved, in the hope that the conclusions thereby reached will not be so different from those obtained by more refined methods as to be seriously misleading.

In most types of production we have to consider the problem of the optimum rate of application of variable factors, including raw materials, to certain fixed equipment of which the useful life does not greatly vary with the intensity of utilisation. In other words, the proportion of marginal cost which consists of user cost is relatively small, and even substantial differences in estimates of user cost would have very little effect on total marginal cost and

on the rate of output. In the case of a mine, however, the position is the exact opposite. There is a given stock of raw material of which the rate of output, and therefore the length of life, is almost infinitely variable according to the amount of fixed capital and other resources which are applied to its exploitation. In this case, every ton of ore extracted means a ton less to be extracted at some future date; and if the deposit is a valuable one, which is expected to show a large profit over costs of extraction, the greater proportion of marginal cost may be the user cost of the deposit. In this case the simplest method of approach to the problem of the optimum rate of output seems to be to attempt to ascertain the scale of output at which the discounted present value of total future receipts during the whole life of the deposit shows the greatest margin over the discounted present value of all costs to be incurred.

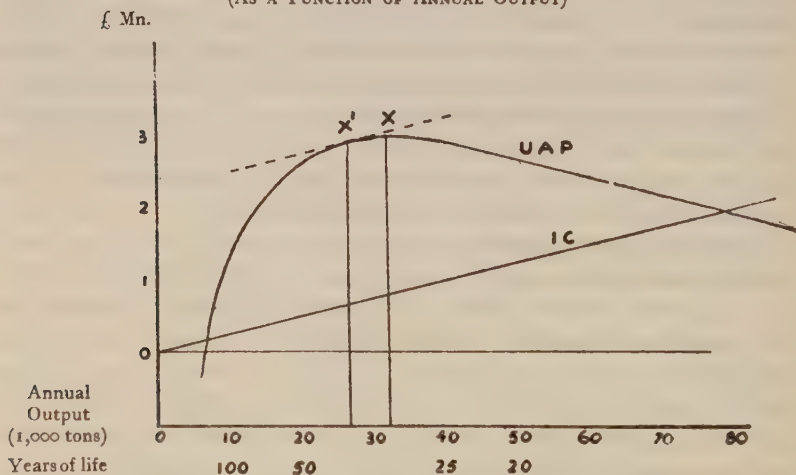
Let us attempt an examination of this question by taking the case of a virgin mine for which we have to decide the scale of capital equipment, rate of annual output, and life, which give us the largest present value of the future profit. To begin with, we shall make certain initial simplifying assumptions, and shall then observe the effects of their progressive removal. Let us assume, therefore, that we are studying the exploitation of an undeveloped ore deposit of given size, the contents of which are completely homogeneous, equally accessible and exactly known. Let us further assume constant costs and a constant price of the product. On these assumptions, at any positive rate of interest it will pay to work out the deposit in the shortest period that is physically possible. If we carry our assumption of constant costs to absurd extremes, it will be most profitable to work it out instantaneously. At a zero rate of interest, on the other hand, any rate of output is as good as any other, and the problem is indeterminate.

Let us now abandon our assumption of constant costs, and assume that costs per unit of output (since the ore is at present assumed to be of constant grade, output can be calculated equally well in terms of tons of ore or ounces of gold) are free to change with the rate of output. These costs may be divided into two main categories. Of these one is working costs—costs of labour and of non-durable or non-specific equipment which must be incurred more or less evenly through time. It is not unreasonable to assume that working costs per unit of output will vary with the rate of output, for reasons which are common to all types

of enterprise. Up to a point the increased specialisation rendered possible by increasing the scale of output will cause average working costs per unit produced to fall as the rate of annual output rises. Beyond a certain point the application of additional factors to a given mine will cause diminishing returns to set in and average costs will begin to rise again. In some cases, where the mine itself is very large, diseconomies of large scale may begin to appear after a certain point, due to the increasing costs of central control. Further, where the supply of factors of production to this particular mine is not perfectly elastic, the price per unit of factors will rise and with it the average cost per unit of output. We may summarise these conclusions by saying that working costs will fall for a time as annual output increases and sooner or later begin to rise again. It is possible that there is a range of output over which working costs are constant, but it is at least equally possible that there is a single rate of output at which they are at their lowest point. Since on our present assumptions the quantity of gold to be produced from the mine is given, the point of lowest average working cost per ounce produced is also the point of lowest aggregate working cost for the whole output of the mine, and since the price of gold is also given, it is the point of highest average and aggregate working profit.

DIAGRAM I.

UNDISCOUNTED AGGREGATE WORKING PROFITS AND INITIAL COSTS
(AS A FUNCTION OF ANNUAL OUTPUT)



UAP. Undiscounted Aggregate Working Profits.

IC. Initial costs.

X. Point of maximum profit with no initial costs and a zero rate of interest.

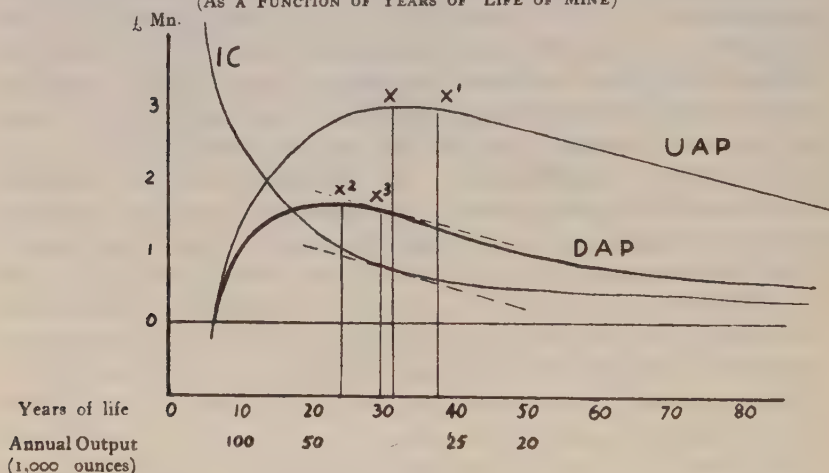
X'. Point of maximum profit with initial costs *IC* and a zero rate of interest.

In the absence of any costs other than working costs and in the presence of a zero rate of interest, the most profitable life of the mine would be that at which undiscounted aggregate working profit (curve *UAP* in diagram 1) was at its maximum (x). In most mines, however, there will be a second type of cost—the irregularly occurring cost of durable and specific equipment. A large part of this equipment cost, under our present assumptions, will be incurred at the very beginning of the life of the mine and before any gold is produced, and if we assume for the sake of simplicity that the whole of it is incurred at the beginning, the assumption may not be very unreal. It will further simplify exposition if we assume that the initial expenditure on durable and specific equipment (of which in the case of deep-level mines the most important item will be the mine shafts) will be directly proportionate to the designed rate of annual output, though this assumption is in no way essential to the argument. In this case, as the absolute horizontal scale is in terms of annual output, the curve of initial costs (*IC* in diagram 1) will take the form of a straight line sloping upwards and to the right from the origin. At a zero rate of interest, the most profitable output rate of the mine will be that at which the undiscounted aggregate working profit most exceeds initial costs. In diagram 1 this point will be where the curve *UAP* is parallel to the line *IC*. We shall find that this new optimum point (x^1) will lie to the left of the highest point of the *UAP* curve (x), and will move further to the left the steeper is the slope of *IC* up to the point where *IC* becomes tangential to the *UAP* curve and the development of the mine ceases to be profitable. Thus the greater the cost of initial equipment per unit of annual output, the smaller will be the most profitable rate of annual output and the longer the optimum life of the mine. This is presumably the chief reason why alluvial mining areas, which require relatively little durable and specific equipment per unit of annual output, are usually worked out more rapidly than quartz or banket mines, and why a shallow mine is likely to have a shorter life than a deep one.

We must now abandon our assumption of a zero rate of interest. What in fact a mine-owner would wish to maximise is not the aggregate net profit of his mine over the whole period of its life, but the discounted present value of the

aggregate net profit. This involves the discounting back of the working profit to be earned throughout the life of the mine and the deduction from it of the actual initial cost. Since the discounting must be done on an annual basis, it will be convenient to change our absolute horizontal scale from annual output to its reciprocal, years of life of the mine. If we keep the origin as zero, this will involve the reversal of the diagram. The Initial Cost curve now becomes a rectangular hyperbola.

DIAGRAM II.
UNDISCOUNTED AGGREGATE WORKING PROFITS
DISCOUNTED AGGREGATE WORKING PROFITS AND INITIAL COSTS
(AS A FUNCTION OF YEARS OF LIFE OF MINE)



UAP. Undiscounted Aggregate Working Profits.

DAP. Discounted Aggregate Working Profits.

IC. Initial costs.

X. Point of maximum profit with no initial costs and zero rate of interest.

X¹. Point of maximum profit with initial costs *IC* and zero rate of interest.

X². Point of maximum profit with no initial costs and a 5 per cent. rate of interest.

X³. Point of maximum profit with initial costs *IC* and a 5 per cent. rate of interest.

If we now proceed to discount the aggregate working profit at any given rate of interest, we shall obtain a new curve of *discounted* aggregate working profits (*DAP*). This curve will coincide with the *undiscounted* curve (*UAP*) when profits are at zero, will fall by an ever increasing proportion below *UAP* as the life of the mine is increased, and will again coincide with it when zero profits are again reached. We shall find both that the peak of the *DAP* curve (*x²*) lies to the left of the peak of the *UAP* curve (*x*) and that the point (*x³*) where it shows the greatest margin over the initial costs curve will also lie to the left of where the

UAP curve showed its greatest margin ($\times^1$). Thus the life of the mine will be shorter and the annual output greater with a positive than with a zero rate of interest. We shall also find that the higher the rate of interest the higher will be the optimum annual output and the shorter the life up to the point where the *DAP* curve becomes tangential to the *IC* curve and the development of the mine becomes unprofitable.

This is true even though the expansion in the rate of output involves additional initial expenditure on capital equipment, up to the point where the increase in initial expenditure becomes equal to the increase in the discounted present value of future working profits.

Thus conditions are conceivable in which a rise in interest rates will make profitable increased expenditure on capital equipment. At first sight this seems contrary to the conclusions of the theory of capital. But the contradiction is only apparent, for the ultimate effect of the rise in interest rates is to accelerate the rate at which the ore is consumed, and to shorten the life of the mine. It is very doubtful, moreover, whether even on our assumptions of homogeneity of ore in each mine and the absence of uncertainty, the *total* demand for capital for mine equipment would increase. For a rise in the rate of interest, while increasing the optimum scale of equipment of such mines as it still pays to develop, will probably prevent other mines, with smaller potential profitability, from showing a profit even at the optimum rate of output, and will therefore destroy their potential demand for capital. Only if all potential mines have ore so rich that the rise in interest rates has little effect on the world total of workable ore, is the rise likely to have the effect of increasing the total demand for gold mining capital.

The importance of the effects of changes in the market rate of interest on the rate of gold output is further diminished if we remove our assumption of perfect foresight concerning the contents of our mine, future costs of production and future selling prices. As soon as any substantial degree of uncertainty is present, the supply of capital to a given mine ceases to be elastic. The main reason for this is that, whatever the effect on the *total* amount of profit earned, the *rate* of possible profit *per unit of capital employed* falls as the amount of capital is increased. In order to attract capital to a highly speculative venture it is essential that the *possible* profits should be very high. The risk is high

because the capital must be expended largely on equipment (including knowledge) which is specific to the mine in question. Any over-spending on development and equipment cannot therefore be rectified, while a mistake in the opposite direction can usually be rectified by further expenditure. Mines about whose contents or costs there is considerable uncertainty are, therefore, started on the smallest possible scale. A few hundred or thousand pounds are spent on prospecting an area where gold is only a possibility. When the possibility becomes a probability, more capital can be obtained and profitably applied to financing development on the smallest practicable scale. As the probability grows and uncertainty diminishes, more and more capital can be added and production increased towards what would be the optimum if there were perfect knowledge. Thus the greater the certainty, the greater the annual output and the shorter the life of the mine. This conclusion has particular interest in relation to uncertainties about the future price of gold. The possibility of a fall in the price will certainly discourage investment in gold mining, prevent present output from increasing as much as it would otherwise have done, and lengthen the lives of the mines.

It is interesting to note that where it is technically essential, as in most deep-level mines, to begin the development of a new mine (or of a new area of an existing mine) by means of a large initial capital investment, development is likely to be delayed until uncertainty has been greatly reduced, perhaps by the gradual extension of contiguous mining areas.

The elasticity of the supply of capital to speculative mines is not, of course, constant, and there are times when it increases so greatly that the foregoing considerations cease to have general application. That there are periods when the risks of new development are more gladly borne than at other times, in no way differentiates gold mining from other speculative industries, which are equally characterised by investment fashions or booms. The chief difference between gold mining and other booms lies in the times of their occurrence. The last two great gold mining booms, that of 1894-5 and that of 1933-6, have taken place during the early stages of industrial revival after a depression, when risk-bearers have begun to recover their nerve after the preceding crisis, but when there is still an unemployed

surplus of fixed assets in most other types of industry. The lower prices of factors (and now the higher price of gold) during the depression have reduced the costs and increased the profits of existing mines, and have encouraged discoveries of new mines and projects for the extension of old ones. The fall in interest rates and the higher profits have combined to raise the prices of shares of established mines, to a point where they offer relatively little prospect of further appreciation. It is not surprising that in these circumstances the supply of unemployed risk-bearing tends to flow into the shares of new and developing mines, nor that promoters multiply the supply of shares to meet the demand. Under present conditions, it is probable that quite a large part of the money subscribed will actually be used to develop and equip new gold mines, a proportion of which will ultimately produce gold in substantial quantities.

We can now return to our consideration of what effect changes in costs of production or in the price of gold have on output. Let us for the moment continue our assumption of a homogeneous ore body, so that changes in costs do not affect the size of the stock of ore that can be worked at a profit, and let us at present consider only the effect on the rate at which an unchanged stock of ore is worked.

We shall find that the effect on the optimum life of a mine of a change in working profits will depend on the way it alters the slope of the discounted profits curve. By way of illustration we may consider three of the most probable ways in which working profits may alter:—

(1) A rise in working profits by a given number of shillings per ounce (such as might be caused by a rise in the price of gold), representing a rise in the undiscounted profits curve by an equal amount throughout its length. Since the new *undiscounted* curve is parallel to the old one, the new *discounted* curve will approach the old discounted curve as the life of the mine is lengthened. The peak of the new *DAP* curve will lie slightly to the left of the old one, while the downward slope to the left is less steep and to the right more steep in the new *DAP* curve than in the old. The point of maximum margin over the initial cost curve (x^3) will therefore move to the left and the optimum life of the mine will be shortened.

(2) A rise in working profits by a given percentage (such as might be caused by an equal proportionate rise in the

price of gold and in working costs). In this case the rise in the undiscounted profits curve will be at its maximum when the curve is at its highest point, and will fall to zero as the curve falls to zero, so that the undiscounted curve will fall more steeply than before in both directions. The peak of the discounted curve will be directly above the former peak, but the new curve will fall more steeply in both directions than the old one. Its point of maximum margin above an unchanged initial cost curve will therefore move to the left and the optimum life of the mine will be shortened. The effect is identical with that of a fall in initial costs, working costs and the price of gold being unchanged. If initial costs as well as working costs rise proportionately with the price of gold, the optimum life is unchanged.

(3) A rise in working profits proportionate to the working costs incurred in earning it (such as might be caused by a fall in working costs unaccompanied by a change in initial costs or in the price of gold). In this case the rise in working profits is least when working profits are at their maximum and increases as profits fall to zero. The undiscounted curve will therefore fall less steeply in both directions than before. The peak of the discounted curve will move to the left more than in case (1), and the new discounted curve will fall less steeply to the left than the old one. Whether it will fall more or less steeply to the *right* will depend on the shape of the undiscounted curve and on the rate of interest. Generally speaking, the optimum life will be shortened unless the rate of interest is very low or unless costs rise very rapidly as the rate of annual output falls ; it will also probably be shortened in any case if initial costs are very small.

On the whole it may be said that, except in very exceptional conditions, the effect of a rise in working profits will be to increase the most profitable rate of annual output and to shorten the optimum life. A fall in initial costs will have the same effect. Conversely, a fall in working profits or a rise in initial costs will tend to lengthen the optimum life.

In the foregoing discussion, it will be remembered that we are considering the optimum scale of output of a mine upon which nothing has yet been spent, and for which we are therefore quite free to decide the optimum expenditure on equipment. Once a decision has been made and specific capital equipment installed, the expenditure on that equip-

ment becomes irrelevant for purposes of calculation. All that matters is the present value of the excess of future revenue over future expenditure. If we find that we have underestimated the optimum annual output, or if changed conditions make an increase profitable, it is always possible (in the absence of serious indivisibilities) to adjust the position by an increase in specific equipment. But if we find that we have overestimated the optimum amount of equipment, we have to consider how to maximise the present value of the excess of future revenue over future working costs only, and the deterrent effect of rising fixed costs per unit of output as output is increased will be absent. We shall, therefore, find it profitable to continue to produce, so long as the equipment lasts, an annual output greater than that which we should have arranged to produce if we had had better foresight, though possibly smaller than the output it was originally intended to produce.

It is this factor of the irrevocability of most of the capital expenditure on gold mines which helps to maintain the level of gold output after an investment boom. On such an occasion it is only to be expected that many speculative shares will be bought above the price that a rational estimation of the chances and dimensions of future profits would justify, and that many mines will be developed and equipped which with better foresight would either not have been developed at all or would have been developed on a smaller scale. Nevertheless, many of these will produce gold in an amount, and at a cost, which, while not such as to render the original investment profitable, will be sufficient to prevent the abandonment of shafts and equipment already in existence. So long as these last, output will remain above the level which it would have reached under conditions of greater foresight. Thus an unfounded expectation of increased future profits—due, perhaps, to the unfulfilled hope of a rise in the price of gold—may have the effect of increasing the output of gold over a period of many years.

We must now turn to the consideration of the effect of a change in costs or in the price of gold on the amount of ore which it will pay to mine. Let us for a moment longer retain our assumption of homogeneous ore, and consider the question of an increase in the available supply of ore of the existing grade without a reduction in the cost of mining

existing ore reserves—due, perhaps, to an invention that has rendered possible the mining, under the same conditions as the existing stock, of ore hitherto regarded as inaccessible. In this case, after the delay due to the time taken to add to the capital equipment, it will pay to expand the rate of output. Unless, however, the cost of production per ounce is the same for the new output as for the old, the scale of output will not increase proportionately. If the effect of increased output is to increase costs per unit of gold, annual output will increase less than proportionately to the increase of ore reserves, and the life of the mine will be lengthened, while if costs per unit decrease with increased output, output will increase more than in proportion, and the life of the mine will be shortened. The former possibility seems to be the most likely.

We now have examined, on our simplified assumptions, the two possible ways in which reduced costs or higher prices may increase output—by increasing the rate of working of the existing ore reserves, and by increasing the ore reserves and the scale of working of the whole mine. We must now abandon the assumption of homogeneity of ore, and bring our assumptions more closely into accordance with actual conditions. Let us now assume a mine with a wide range of ore grades varying from the merest trace of gold to half an ounce or more to the ton. The effect of a change in costs or in the price of gold will now be necessarily twofold. It will alter the cost of working the ore which throughout remains within the limits of payability, and by altering those limits it will alter the amount of ore in the mine that can profitably be worked. Before, however, beginning our consideration of the effect of these changes upon the size of the annual output it is necessary to make a digression in order to examine the factors which govern the order of working of ore of different grades of richness.

If the order in which the ore is mined makes no difference to costs and to the total profits earned over the whole life of the mine, it is clear that, at a positive rate of interest, the mining company will maximise the present value of its profits by mining the richest ore first. If, as may sometimes happen, costs are *reduced* by mining the richest ore first, this course will be profitable even at a zero rate of interest. But it more frequently happens that to mine the richest ore first, and leave the less payable for future years, may

increase the cost of production and possibly lead to the ultimate abandonment of much of the less payable ore. This may well occur, for instance, if small areas of high and low grade ore are closely intermixed. The additional costs of selective mining, and of maintaining old stopes with a view to returning later for the extraction of the low grade ore left behind, may be so high as more than to offset the advantages of concentrating the higher earnings in the earlier years. Nevertheless it will always pay to sacrifice *some* part of the total profits earned over the whole life of the mine for the sake of increasing the profits in the earlier years. How far selective mining will be a payable policy will depend on the distribution of ore in each particular mine. Broadly speaking, the larger the more or less homogeneous blocks of high and low grade ore, the more profitable to the shareholders will a policy of selective mining be.

Nevertheless, such a policy of 'picking the eyes of the mines' is universally frowned upon by responsible mining opinion. In so far as this is due to a belief that the consequent rise in costs would render such a policy unprofitable, this point of view is justified. But there is reason to believe that the policy of selective mining could profitably be carried a good deal further than in practice it is. Why then do the mining authorities so object to it?

It is difficult to find any clear answer to this question, but on the whole the objections seem to be based on two main grounds. Firstly, the practice of selective mining clearly lends itself to fraud on investors. If the profits earned in the early years of a mine are greatly above the level which can be maintained throughout its life, investors may well be induced to expect the high dividends to continue and pay too much for the shares. This will in turn impair the investment reputation of gold mines as a whole, and cause yields of all mines, including those which do not or cannot practise selective mining, to be capitalised in the market at a lower level. Closely connected with this is the argument that shareholders prefer a steady to a declining income, even though the discounted present value of the declining income is greater. This latter difficulty does not appear to be insuperable. It is always open to a mining company to withhold part of the high profits earned in the early years and re-invest them, either in the same mine or elsewhere, so as to earn interest or profits upon them.

In this way dividends could be maintained at a more or less constant level higher than that which is possible under the system of mining proportionately from all grades of ore, which is tantamount to investing part of the potential profits without interest in holding back stocks of rich ore.

The other important reason for the dislike of selective mining is that most of those who are responsible for the formation of mining opinion are interested rather in the longevity of the mines than in their profitability to shareholders. For managers, employees, consulting engineers, as well as for those who are dependent on the gold mines for their market, the important thing is that the mines should continue to employ as many factors as possible for as long as possible. Selective mining without a consequent rise in costs would not necessarily shorten the life of the mine, for all payable ore would still be mined, though in a different order. But if the effect of selective mining were to raise costs, the amount of payable ore would be reduced and the life of the mine shortened, while even if costs were not affected by the order of mining, a later rise in costs, due to other causes, would shorten the life of the mine much more if the high grade ore had already been extracted. This would not involve any additional loss to shareholders (indeed, the expectation of a subsequent independent rise in costs would make selective mining profitable even at a zero rate of interest) but it would mean that the risks of factors becoming prematurely unemployed would be increased—a contingency not to be regarded with equanimity by employees, suppliers, local authorities or the government.

Whatever the true reasons, the practice of the mines seems to approximate closely to their stated policy of milling ore of the same average grade as that contained in the mines. This is certainly true, at least, so far as concerns that part of the contents of the mines which has been developed, sampled, and included in the published ore reserves—usually about the equivalent of three or four years' supply to the mill. It is not possible to say as definitely how far it is followed in deciding how much of each of the various grades of ore is to be developed and added to the ore reserves. Where high and low grade ores are closely intermixed there is little room for discretion; but where some zones or reefs are believed to consist mainly of high grade and others mainly of low grade ore, it is clear that for many years the

average grade of the ore added to the known and published reserves may be largely controlled by managerial policy. The fact that, when a mine is approaching the end of its life, the average grade of ore milled usually falls, seems to indicate that some low grade ore is left after the high grade ore has been worked out, and that *some* degree of selection is, therefore, practised. In any case, since the contents of undeveloped ore blocks can be estimated only roughly, the policy of mining equal proportions of each grade cannot be followed with any high degree of exactitude.

On the whole, however, it seems that the assumption that mines follow the policy of milling the average grade of ore contained in the mine is sufficiently realistic to permit practical deductions to be drawn from it. This is very convenient for purposes of analysis, since for many purposes a mine can be considered as containing ore of homogeneous grade equal to the average of the various grades it actually contains. The conclusions previously reached in our consideration of a mine with homogeneous ore, therefore, are usually more or less valid, and we can proceed with our examination of the effects on output of a change in costs or in the price of gold.

Owing to the presence in a producing mine of durable and specific equipment, the effects of increased and decreased working profits are not fully symmetrical. We must therefore consider them separately. Let us first consider the case where working profits have increased. This will mean that some ore, of a lower grade than any at present worked, will come within the margin of payability. The quantity of payable ore in the mine will, therefore, be increased and its average grade reduced. As we assume that the mine's policy is to mill ore of an average grade equal to that of the mine as a whole, the average grade of ore milled will fall, and less gold will be produced per ton of ore milled. On the other hand, the increase in the working profit earned and the increase in the payable ore content of the mine will make it profitable to increase the number of tons of ore milled per annum. In the long run, the net effect upon the annual output of gold of the two opposing influences will depend on the grades and proportions of the new and old ore, and upon the elasticities of the supply of labour, capital and other factors. If the quantity of low grade ore which is added to the reserves is relatively small, the

reduction in average grade will also be small, and unless the supply of factors is very inelastic, the increased rate at which it now becomes profitable to work the existing ore will cause annual output to rise by proportionally more than the gold content of the mine, so that its life will be reduced. Where the quantity of low grade ore added is substantial, this is unlikely, and the annual output of gold, though higher, will probably increase by less than the gold content of the mine, so that the life of the mine will be lengthened. Finally, where the addition of low grade ore and the reduction in grade are very large, a mine may possibly find it profitable to increase its tonnage of ore milled only by an amount which is insufficient to offset the fall in grade, so that the annual output of gold will fall and the life of the mine will be lengthened more than in proportion to the increase in its gold content. Of the three possibilities, the second seems much the most likely.

The extent to which the effects of an initial fall in costs or rise in the price of gold are perpetuated will depend largely upon the elasticity of the supply of factors, not merely to each mine, but to the industry as a whole in each area. If the supply is inelastic, as the whole industry endeavours to expand its tonnage of ore milled, the cost schedule of each particular mine will rise, some of the new low grade ore will cease to be payable, and the average grade will rise. If the rise affects working costs more than costs of durable and specific equipment, the fall in capital costs relatively to working costs will tend to increase the rate of output for any given average grade of ore milled; if the rise in working costs goes so far that the average grade milled returns to its former level, the continued lower level of capital costs will make profitable an increased scale of working and a shorter life for the mine. If capital costs rise *pari passu* with working costs until the average grade milled recovers to its former level, the scale of output will not be affected, unless in the meantime the amount of capital equipment has been increased.

The case in which there will most certainly be a permanent fall in the rate of output is where a rise in the price of gold adds a large new tonnage of low-grade ore to the reserves and therefore greatly reduces the average grade of ore milled, and where at the same time the price of a factor in inelastic supply is monopolistically prevented from rising.

In this case there will be no rise in costs or in the grade of ore milled ; but the shortage of the factor will limit the increase in the output of ore, which will therefore be insufficient to offset the fall in grade.

In the present instance, the rise in the price of gold has coincided with a fall in alternative demands for factors, and, despite the greatly increased demands of the mines, costs have remained low. If, however, the price of gold were raised at a period of full employment, it is possible that the resulting increase in output would, in many areas, be relatively small ; while if the prices of factors were prevented from rising, it might actually decrease. Even as it was, the improvement in the demand for diamonds, farm produce, and base minerals in 1936-7 rapidly brought complaints of a shortage of native labour in South Africa, and it is only now that the effects of the renewed fall in prices are being seen in an improvement in the labour supply.

While the long run effects of a large and sudden rise in the price of gold or fall in costs are to some extent dependent on circumstances, the short run effects are still more doubtful. The time taken to reduce the grade of ore milled to the new average of the mine, though appreciable, is in many cases shorter than the time needed for increasing the annual tonnage of ore milled. Broadly speaking, the delay in expanding output will depend on the accessibility of the ore. Where the gold is in alluvial deposits or shallow mines, the time needed for expansion may be quite short. In deep mines, it may well be a matter of years before the rate of output can reach its new optimum, unless there is some excess capacity in the existing fixed equipment. The same considerations apply to the development of new mines or the reopening of old ones. If the ore is near the surface, or if disused fixed equipment has been kept in serviceable condition, the response of increased output to the stimulus of higher profits will be rapid. If deep shafts have to be sunk and deep development carried out, it will be slow. Thus in a deep mining area, where the existing equipment is already used to capacity, and where the rise in working profits has brought much additional low grade ore within the limits of payability, the existing amount of fixed equipment will be temporarily used for raising and milling ore of a lower average grade, and output of *gold* will decline. As equipment is expanded and the tonnage of ore milled

increases, gold output gradually recovers to its former level and probably ultimately rises well above it. But the intervening period of lower output may last for several years.

There is another factor which may intensify this temporary fall in the output of gold. In an old-established mine there are probably substantial areas of low grade ore which have been rendered known and accessible by the development and extraction of the higher grade ore, but which it has hitherto not paid to remove. Some of these low grade zones have no doubt been irretrievably lost by the collapse of old workings, and so forth, but it is likely that enough will remain to add a larger proportion of low grade ore to the developed ore reserves than the amount of still undeveloped low grade ore bears to the rest of the mine. Thus the average grade of the developed ore reserves becomes lower than the average grade of the remainder of the mine. As the average grade milled will approximate to that of the known reserves, it will for a long time be below the average grade of the mine, rising slowly as the existing ore reserves are replaced by new development.

It is largely to the foregoing causes that we must attribute the remarkable difference between South Africa and other gold producing countries in the years 1932 to 1937. In 1932 the gold production of the world, excluding South Africa and Russia, was about 10.8 Mn. ounces. It thereafter rose rapidly and continuously to 11.4 Mn. ounces in 1933, 13 Mn. in 1934, 14.3 Mn. in 1935, 16.4 Mn. in 1936, and 17.8 Mn. in 1937. In South Africa, on the other hand, the output of gold *fell* from 11.6 Mn. ounces in 1932, the year at the end of which South Africa left the gold standard, to 11.0 Mn. in 1933, and 10.5 Mn. in 1934, and it was not until 1937 that the output again reached the 1932 level. A glance at the figures shows the cause of this movement. Between 1932 and 1934 the average grade of ore milled on the Witwatersrand fell from 6.3 dwts. per ton to 5.0 dwts., so that, despite an increase in tons milled from 34.6 Mn. to 39.4 Mn., the output of gold showed a decline of over 1 Mn. ounces. Since 1934 the increase in tons of ore milled to 49.9 Mn. has more than offset a further decline in the average grade from 5 dwts. to 4.46 dwts., and the output of gold has steadily expanded. It is probable that this expansion will continue. In 1932 there was only one developing mine in

South Africa. In 1937 there were 20 developing mines, of which many seem likely in due course to produce gold in substantial quantities. It is true that the number of natives employed on the gold mines has already risen by nearly 50 per cent. since 1932, and that it may be difficult to find the further additions to the supply which will be necessary, if all the mines, new and old, are to be worked to full capacity. But even if the native supply of labour were to remain in the vicinity of the present total, it is probable that the gradual transfer of workers in new mines from development to production, and the continued introduction of more labour-saving methods, would allow the rise in output to continue. Hitherto the rise in the world's output of gold has been entirely due to expansion outside South Africa. Henceforth it is likely to be increasingly due to rising South African output, which may well be still expanding when output in other countries, with deposits at once more rapidly developed and more rapidly exhausted, has already begun to fall.

A further point which is well illustrated by the recent history of South Africa is the difference in the results of a rapid and of a gradual change. Between 1928 and 1932 average costs per ton of ore milled on the Witwatersrand fell gradually from 19s. 9d. to 19s., though the decline in effective costs, in the form of a more plentiful supply of native labour, was a good deal greater. The average grade of ore milled fell from 6.5 dwts. to 6.3 dwts., but owing to the slowness of the change the tonnage of ore milled had time to rise from 30 Mn. tons to 34.6 Mn. tons, so that the output of gold increased from 9.9 Mn. to 11.0 Mn. ounces.

The best historical instance of a movement in the reverse direction—of a rapid rise in costs and a fall in working profits—occurred during and after the War. For South Africa the best years to take are 1915–1919, for the higher costs of 1920 and 1921 were more than offset by the higher price of gold, and the fall in the price of gold from 1921 to 1924 was offset by lower prices and wages. In 1915 the Witwatersrand mines milled 28.3 Mn. tons of ore of an average grade of 6.2 dwts. at an average cost of 17s. 5d. per ounce and produced 8.8 Mn. ounces of gold. By 1919 the average cost had risen to 22s. 11d. per ton, and the tons milled had fallen to 24.0 Mn. or by 15 per cent., but the average grade had been raised to 6.7 dwts. and the output of gold was

only 700,000 ounces, or 8 per cent., lower at 8.1 Mn. ounces. In the case of a still sharper rise in costs, or of a sudden fall in the price of gold, it is quite possible that the rise in the average grade of ore milled might temporarily more than offset the reduction in tonnage, so that for a time the output of gold might conceivably rise. This would be most likely in the case of a mine where there were both a large amount of durable and specific equipment and zones of high grade ore which could be mined selectively without much additional increase of costs. In such a case, the output of gold would remain higher so long as the durable equipment and the supplies of high grade ore lasted. On the other hand, mines with little specific equipment would probably reduce their scale of output fairly rapidly, while mines with little ore above the new level of payability would soon be obliged to close down. It is therefore not likely that a fall in the price of gold would be followed, even temporarily, by a rise in output in the world as a whole, though a temporary rise might well take place in the output of certain mines, or even of certain fields.

To complete a study of the causes of changes in the output of gold, some reference must be made to the effects of government action. The subject is a wide one, and raises many interesting and difficult questions. Here it is possible only to attempt to classify the main types of Government action and to give some examples of their possible results.

Types of Government action which affect the output of gold fall into four main classes—(1) Taxation and restrictions on movement, etc., which affect the prices of factors. (2) Methods of general direct taxation. (3) Special taxation of (or subsidies to) gold mines. (4) Regulations prescribing the conditions under which mining properties can be acquired and worked.

The first of these requires little elaboration. Government action is one of the various causes which determine the local prices and supplies of factors of production. The intervention may, for instance, take the form of import duties or quotas on the stores required by the mines, or of high transport rates on state railways for the requirements of the mines. In South Africa the gold mines have at various times made strong complaints against both these practices. It may take the form of a state monopoly of an essential requirement, such as the dynamite monopoly which proved

such a source of friction between the gold mines and the Government of the Transvaal before the Boer War. It may take the form of restrictions upon the movement of labour, either by local or by foreign Governments. The recent curtailment of supply of native labourers from Mozambique to work in the Union might in other circumstances have been a serious embarrassment to the mines. Another example is the rule, imposed by the South African Government in order to reduce mortality among Transvaal mine natives, whereby the mines were forbidden to employ natives coming from north of latitude 22° South. The mines now claim that improved methods of hygiene have eliminated the former risks for tropical natives, and the results of the present experimental quota are said to have borne out this claim. If this restriction is relaxed it will go far towards assuring to the mines at existing wages the supply of labour which they are equipping themselves to employ.

Secondly, methods of general direct taxation may affect the supply of capital to mines, and conceivably even the policy of the mines, in so far as they discriminate against income earned from wasting assets. In the United Kingdom, for instance, the whole of mining dividends are treated as income for purposes of income-tax and surtax, although a substantial proportion (in the case of mines with short lives, a very large proportion) of the income should be used to amortise the wasting asset. The methods of taxation in use in the United Kingdom therefore tend to divert the flow of capital from mining into other investments, and to restrict mining development. They further tend to discriminate against mines with short lives, and to make the extension of the life of a mine beyond its optimum point profitable for British shareholders, and especially surtax-paying shareholders. If such shareholders are both aware of where their advantage lies and in a position to influence the policy of the company, there will be a further tendency for the current output of minerals, including gold, to be reduced.

If any form of special direct taxation is imposed on gold mines, it must necessarily have a deterrent effect on the development of new mines or the investment of additional capital in old ones, though this effect may be reduced by suitable concessions, such as the complete or partial exemption of new mines from taxation for a period, the privilege of

allowing capital expenditure out of income as a deduction from profits for purposes of taxation, an increase in permitted rates of capital depreciation, etc. While, however, a general expansion of output can be secured only by some form of subsidy, such as that given to Australian gold mines from 1930 to 1932, it is possible to frame a tax in such a way that it induces such mines as are developed to mine ore of lower average grade than they otherwise would. The present form of gold mining excess profits taxation in South Africa is designed to have this effect. It was originally introduced, in a different form, to divert to the Government a large share of the immense increase in profits which the mines would obtain from the devaluation of the South African pound, and at the same time to maintain their demand for factors at as high a level as possible, while lengthening their lives.

In its present form the tax is both simple and ingenious, and it might well be applied by other Governments which desire to induce industries to give increased employment. In addition to normal income tax at a rate of 3s. in the pound, or 15 per cent., the mines must pay an excess profits tax equal to 35 per cent. of their gross receipts less 40 per cent. of their costs, or, to put the same thing another way, a total of 50 per cent. of their profits less 5 per cent. of their costs with a minimum of 15 per cent. This means that the more costs the mines can incur in earning a given profit, the better off they are, and that it is worth their while to earn a slightly smaller profit if by so doing they can have larger costs and a larger deduction from their tax. Its effect is, therefore, the opposite of that of indirect taxation, which raises the cost of factors employed, and increases the amount paid in tax as working costs rise. The general effect of such a tax is to reduce the incentive to install labour- and material-saving equipment, and to raise working costs relatively to capital costs. In the particular case of the gold mines, it also encourages the milling of ore of a lower grade than would otherwise be profitable. It thus tends to lengthen the lives of the mines, while in the short run, and possibly also in the longer run, it tends to cause a greater reduction in the annual output of *gold* than an ordinary tax on profits would have done. Thus the form which South African taxation has taken has tended to intensify the effects on output of the mines' policy of milling the average grade of the mine.

Finally, the general structure of mining law necessarily has some effect on the rate of output. If, for instance, gold deposits are of a kind which it is possible to work on a small scale, a mining law which encourages their working as public diggings, by a large number of independent miners, each working a small claim with very little equipment, will probably cause the annual rate of output to be higher and the life of the deposit shorter than if they are worked on a larger scale and by more capitalistic methods.

Again, where the undermining rights of gold-bearing ground are owned by the State, the output of gold may be greatly affected by the terms on which the State is willing to sell or lease the ground. In such a position the State may act like a private land-owner, making the most profitable arrangements possible for the mining of the ground, and only withholding mining areas from development if it believes that their value to itself will appreciate so rapidly as more than to offset the loss of interest. On the other hand, if its object is to secure the continuance of mining activity at its present level for a long period, it may deliberately withhold land from development for a time in order to replace existing mines when they become exhausted.

The actual terms and conditions of the leases may also affect the rate of output of the mines after development. The size of the individual mines will depend largely on the State's judgment as to what area constitutes 'a workable proposition', and the larger the size, the longer will the life of the mine tend to be. Secondly, the lease may be drawn in such a way that the interests of the shareholders are different from what they would have been if they had owned the mine completely. If the royalty is a fixed payment per ounce of gold produced, or per ton of ore milled, it will increase costs per ounce or per ton, raising the minimum grade of payable ore and shortening the life of the mine. If it is a uniform proportion of the profit, the position of the State will be similar to that of any shareholder, and the lease payment will have no effect on the rate of output. But if, as is the case with most of the South African leased mines, the Government's share of profits increases as the ratio of profit to output of gold rises, it will pay the shareholders to decrease this ratio at the expense of a diminution in total profits—in other words, to mine ore which would otherwise have been below the limit of

payability, decrease output, and extend the life of the mine. Thus the policy of the South African Government, both through taxation and the terms of its leases, is to check the immediate expansion of the output of gold in order to prolong the lives of the mines. It is to this policy, as well as to that of the mines themselves, that the delay in the rise of South African output is due.

With regard to the future, the prospects of developments in other spheres of economic activity are too uncertain to permit of any definite forecasts; but certain of the conclusions reached in the foregoing discussion may be usefully applied to the consideration of the probable reactions of gold production to the various possible developments elsewhere.

If the conclusions reached above are justified, the rate at which a new deposit of gold will be exhausted will depend upon the rate at which total costs increase as the annual output is expanded. This, in turn, depends largely upon the amount of durable and specific equipment needed per unit of output, so that those mines which need most capital equipment will, generally speaking, be those with the longest lives. But such mines are also those which will generally take longest to reach their optimum rate of output, so that the rate at which output is expanded is often a guide to the period for which the increased output is likely to be maintained. If this is so, those areas where production has responded most rapidly to the stimulus of the higher price of gold are likely also to be those where the deposits will be most rapidly exhausted.

Even if, therefore, the general level of prices and gold mining costs remain in the vicinity of their present level, we may expect to see the rapid rise in output in most countries checked within the next few years, and perhaps succeeded by a gradual fall.

This development becomes still more probable if prices from now onwards assume an upward trend, and gold mining costs tend to rise. In this case we may well see a repetition of the experience of 1850-60 and 1900-1914, when a rapid expansion of gold output was in most countries brought to an end, and in many of them succeeded by a decline.

To this general rule, however, South Africa is likely to provide a striking exception. Owing partly to the depth of the ore deposits and the long delay and heavy cost involved

in providing the necessary shafts and other fixed equipment, partly to the policy of the mines in reducing the average grade of ore milled, and partly to the reinforcement of this policy by Government action, South African output has not yet increased greatly above the 1932 level. That from now onwards the expansion will be both large and persistent is highly probable, especially if the difficulty of augmenting the supply of native labour can be overcome by recruiting in tropical Africa. Once heavy capital costs have been incurred, it is likely that output will be maintained at a high level even though working costs should rise. Indeed a really sharp rise in costs, or a fall in the price of gold, which would probably cause a rapid fall in the output in other parts of the world, might well cause a temporary increase in South Africa, owing to a rise in the average grade of ore milled unaccompanied by a corresponding reduction in tonnage. Further, South African output could easily be assisted in maintaining a high level either by a reduction in gold mining taxation or a change in its form. A rapid rise in prices, which would have the effect of increasing the South African Government's revenue from other sources, would certainly give rise to strong demands for a reduction in gold mining taxation.

Whether the continued rise in South African output will more than offset the declines which in due course may be expected elsewhere is doubtful. On the whole it is probable that, with stationary or slowly rising prices, output from the world as a whole (excluding Russia, where prospects are incalculable) will continue to expand for a considerable time, with South Africa producing an increasing proportion of the total; with rapidly rising prices or a substantial reduction in the price of gold, world output would probably begin to fall fairly soon, despite a probable increase in output in South Africa, and a great increase in its share of the total.

TABLE I.
WORLD GOLD PRODUCTION.

gm. fine ozs.

Average Annual Output	U.S.A.	Canada	Australia	S. Africa	Russia	Other	Total
1841-50	0.5	—	—	—	0.8	0.4	1.7
1851-60	2.7	—	2.7	—	0.8	0.4	6.4
1861-70	2.3	0.1	1.9	—	0.9	0.9	6.1
1871-80	1.9	0.1	1.4	—	1.2	1.0	5.6
1881-90	1.6	0.1	1.2	0.1	1.0	1.2	5.2
1891-1900	2.5	0.4	2.2	1.9	1.2	2.0	10.2
Annual Output							
1901	3.8	1.2	3.3	0.3	1.1	3.0	12.7
1902	3.9	1.0	3.5	1.7	1.1	3.3	14.5
1903	3.6	0.9	3.8	3.0	1.2	3.3	15.9
1904	3.9	0.8	3.8	3.8	1.2	3.4	16.9
1905	4.3	0.7	3.7	4.9	1.1	3.8	18.5
1906	4.6	0.6	3.5	5.8	0.9	4.1	19.5
1907	4.4	0.4	3.2	6.5	1.3	4.2	20.0
1908	4.6	0.5	3.1	7.1	1.4	4.8	21.5
1909	4.8	0.5	3.0	7.3	1.5	5.0	22.1
1910	4.6	0.5	2.7	7.5	1.8	5.0	22.1
1911	4.7	0.5	2.5	8.3	1.6	4.9	22.5
1912	4.5	0.6	2.3	9.1	1.1	5.1	22.7
1913	4.3	0.8	2.2	8.8	1.3	4.9	22.3
1914	4.5	0.8	2.1	8.4	1.3	4.2	21.3
1915	4.8	0.9	1.9	9.1	1.2	4.8	22.7
1916	4.4	0.9	1.7	9.3	1.1	4.6	22.0
1917	4.0	0.7	1.4	9.0	0.9	4.3	20.3
1918	3.3	0.7	1.3	8.4	0.6	4.3	18.6
1919	2.9	0.8	1.1	8.3	0.5	4.1	17.7
1920	2.4	0.8	1.0	8.3	—	3.8	16.3
1921	2.4	0.9	0.8	8.1	—	3.8	16.0
1922	2.3	1.3	0.8	7.0	0.1	4.0	15.5
1923	2.4	1.2	0.7	9.2	0.3	4.0	17.8
1924	2.4	1.5	0.6	9.6	0.9	4.0	19.0
1925	2.3	1.7	0.6	9.6	1.0	3.8	19.0
1926	2.2	1.8	0.5	10.0	1.0	3.8	19.3
1927	2.1	1.8	0.5	10.1	1.0	3.9	19.4
1928	2.1	1.9	0.5	10.4	1.0	3.8	19.5
1929	2.1	1.9	0.4	10.4	1.0	3.8	19.6
1930	2.1	2.1	0.5	10.7	1.0	3.9	20.3
1931	2.2	2.7	0.6	10.9	1.2	4.4	22.0
1932	2.3	3.0	0.7	11.6	1.5	4.8	23.9
1933	2.2	2.9	0.8	11.0	2.2*	5.5	24.6
1934	2.8	3.0	0.9	10.5	3.8*	6.3	27.3
1935	3.2	3.3	0.9	10.8	4.5*	6.9	29.6
1936	3.8	3.7	1.2	11.3	5.5*	7.7	33.2
1937	4.1	4.1	1.4	11.7	6.0*	8.2	35.5

Sources :—U.S.A. Bureau of Mines' *Economic Paper No. 6 (1929)*. *Gold Production of all Producing Countries*.

Imperial Institute, *Mineral Industry Statistical Summary*.

Union Corporation, Ltd.

* Estimated.

TABLE II.

COSTS, RECEIPTS, AND OUTPUT IN THE GOLD MINING INDUSTRY OF THE WITWATERSRAND.

	Costs per ton of Ore milled				Gross Receipts		Ore milled (Mn. Tons)	Av. grade of ore milled (dwts. per ton)	Output of gold (Mn. ozs.)
	White Wages	Native Wages	Stores and other	Total	Per ton of ore milled	Per oz. of gold prod.			
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.			
1911	7 2	4 10	6 0	18 0	27 11	83 11	23·9	6·6	7·9
1912	6 5	4 8	7 7	18 8	29 0	83 10	25·5	6·8	8·7
1913	6 2	4 5	7 4	17 11	27 9	83 9	25·6	6·5	8·4
1914	5 7	4 2	7 4	17 1	26 6	83 8	25·7	6·2	8·0
1915	5 6	4 3	7 8	17 5	26 3	83 8	28·3	6·2	8·8
1916	5 8	4 5	8 0	18 1	26 8	84 7	28·5	6·3	9·0
1917	6 3	4 2	8 9	19 2	27 1	83 8	27·3	6·4	8·7
1918	7 2	4 6	9 11	21 7	27 11	84 0	24·9	6·6	8·2
1919	7 11	4 7	10 5	22 11	31 7	93 7	24·0	6·7	8·1
1920	9 5	5 0	11 3	25 8	35 3	107 3	24·1	6·5	7·9
1921	9 1	5 1	11 6	25 8	35 2	104 7	23·4	6·7	7·9
1922	5 11	5 9	11 10	23 6	31 4	90 8	19·5	6·9	6·8
1923	5 2	5 0	9 10	20 0	29 5	88 4	26·5	6·7	8·9
1924	5 3	4 8	9 8	19 7	29 10	91 0	28·2	6·5	9·3
1925	5 4	4 5	9 5	19 2	27 11	85 5	28·3	6·5	9·3
1926	5 2	4 5	9 5	19 0	27 9	85 3	29·5	6·5	9·7
1927	5 6	4 6	9 7	19 7	28 3	85 3	29·1	6·6	9·7
1928	5 7	4 7	9 7	19 9	28 0	85 5	30·0	6·5	9·9
1929	5 7	4 6	9 6	19 7	27 9	85 6	30·5	6·5	10·0
1930	5 6	4 7	9 4	19 5	27 10	85 5	31·1	6·5	10·2
1931	5 7	4 6	9 3	19 4	27 5	84 9	32·2	6·4	10·4
1932	5 3	4 4	9 5	19 0	27 4	85 4	34·6	6·3	11·0
1933	5 4	4 4	9 7	19 3	35 6	123 1	36·6	5·7	10·4
1934	5 8	4 4	9 3	19 3	34 8	138 7	39·4	5·0	9·8
1935	5 10	4 4	8 6	18 8	32 6	142 4	43·7	4·6	10·0
1936	6 0	4 5	8 1	18 6	31 0	140 6	47·5	4·4	10·5
1937	6 4	4 4	8 3	18 11	31 4	140 9	49·9	4·5	10·8

Sources :—*South African Year Book.**Department of Mines (Union of South Africa) Monthly Statistics.*

The Influx of Labour into the Midlands 1920-37

By BRINLEY THOMAS

THE industrial changes of the last two decades have brought about a marked contrast between the southern and northern parts of Great Britain; and cyclical fluctuations during the period do not seem to have interfered very much with the persistent long-run trend. It is well known that the metropolis and the surrounding counties have witnessed rapid expansion. The area lying to the east of a line drawn from the Wash to Portsmouth accounted for 28.3 per cent. of the insured population, aged 16 to 64, of Great Britain and Northern Ireland in July, 1937, compared with 24.2 per cent. in July, 1923. The spectacular advance of the South East has tended to overshadow the progress made in the Midlands. A great deal of industrial development has, however, taken place in the region immediately west of that line connecting the Wash and Portsmouth. In fact, the high lights in the picture may best be seen when the four Ministry of Labour Divisions situated in the south are combined together, namely, London, the South Eastern, the South Western and the Midlands, and set against the rest of the country. The result is significant. "Of the total numbers of insured persons in employment in Great Britain and Northern Ireland, the proportions for the Northern and Southern Sections were almost exactly reversed between 1923 and 1937. In the former year the Northern Section included 53.5 per cent. and the Southern Section 46.5 per cent., respectively, of the total; in the latter year these proportions had changed to 46.6 per cent. and 53.4 per cent. respectively."¹

In a previous article an analysis was given of the inflow

¹ *Ministry of Labour Gazette*, December, 1937, p. 469.

of labour into London and the South East, 1920-36.¹ I now propose to deal similarly with the Midlands, a Division which contains nearly a third of the insured population of the Southern Section.

I

THE STATISTICAL MATERIAL

The annual exchange of unemployment books by the Employment Exchanges affords an opportunity of measuring the internal migration of insured labour. The characteristics of the data which can be obtained in this way and their use for statistical purposes have been fully discussed in previous articles.² All that is necessary here is to point out the special features of the Return upon which this analysis is based.³ First, a word of explanation is due regarding the area which is to be referred to as the Midlands. The Division of the Ministry of Labour which bears that name has recently had its boundaries altered. For the purpose of the present investigation the Midlands Division covers the area as it was defined in July, 1937: the counties of Derby (except the Glossop and New Mills districts), Hereford, Huntingdon, Leicester, Northants, Notts., Rutland, Salop, Stafford, Warwick, Worcester, the Soke of Peterborough and the Stamford district of Lincoln. The economic structure of this region is characterised by considerable variety. It includes the conglomeration of engineering and metal trades in Birmingham, where the Divisional Office is situated, the Black Country, the Potteries, the Notts and Derby coalfields and the agricultural areas of Hereford, Salop and Leicestershire. Geographically it occupies the very heart of England, and it is the only Division in the country which does not touch the coast at any point. The fact that there is a land boundary all the way round makes the opportunities for short-distance movement into the Midlands more numerous than in the case of the South Eastern Division. In fact, with modern travelling facilities,

¹ "The Influx of Labour into London and the South East, 1920-36," *ECONOMICA*, August, 1937, pp. 323-36.

² *Ibid.*, pp. 323-5 and *ECONOMICA*, May, 1934, pp. 221-3.

³ I am indebted to the Ministry of Labour authorities for giving permission for the inquiry to be carried out and to the officials of the Midlands Division for the admirable way in which the Return was presented. The responsibility for the use and interpretation of the figures is wholly mine.

My thanks are also due to the Economic Research Division of the London School of Economics for granting me the services of a research assistant.

it can hardly be said that "foreign" books exchanged on the border are an indication of much migration in the real sense of the word, except when the books originated in other than neighbouring Divisions. For this reason the figures showing the gross inflow of labour into the two Divisions are not strictly comparable.

The Return, covering 148 Offices, including Juvenile Employment Bureaux, relates to July, 1937, and gives particulars of all unemployment books exchanged in the Midlands which had originally been issued in other Divisions. The presence of these "foreign" books in a Midlands Office indicates that at some time between 1920 and the middle of 1937 the owners of the books moved into the Division.¹ A person may, of course, have migrated in and out several times during these years; but past history cannot be retraced, his movement being recorded only if he happens to be in the Midlands at the date of the exchange of books. The figures cover insured workers between 14 and 64 years of age, classified into men and women aged 18 to 20 and 21 and over, and boys and girls aged 14 to 15 and 16 to 17. Information was also received concerning the number of "Kew" books exchanged at each Office. These are books issued to men when they leave His Majesty's Forces, and there is no means by which the owners can be identified with any "home" area. We know that exactly 44,560 of these books were exchanged in the Midlands: they have been subtracted from the total number of books exchanged before calculating rates of absorption. This category must contain a proportion of genuine cases of transfer from other Divisions; but unfortunately there is no method of estimating its magnitude.

Among the new features of this Return is the inclusion of books belonging to agricultural workers in the totals, their number being available separately for each Office. There is one matter of administration which needs to be mentioned at this point. When the unemployment insurance scheme for agriculture was introduced in May, 1936, a special kind of book of 61 weeks' currency was issued, the purpose of which was to obviate the necessity for exchanging agricultural books in July, 1936. After that date no distinction has been made between the period of currency of

¹ It must be remembered, however, that on the border of the Division there is much cross traffic for employment within daily travelling distance.

Agricultural and General Scheme books. One must be careful in using these figures to make deductions about the migration of agricultural workers, particularly when it is realised that the majority of the 2,025 "foreign" agricultural books were exchanged in Offices near the boundary of the Division. The fact of their appearance there probably reflects the opening of new local agencies in country districts rather than the actual movement of workers. In view of these difficulties it has been thought best, in computing rates of absorption, to exclude the agricultural books from the "foreign" totals.¹

The "Division of Origin" Return for the Midlands is a model of its kind, for, in addition to showing for each Office the Divisions from which labour has been absorbed, it divides males and females into juveniles, young persons and adults and gives an accurate total of "Kew" books and separate information about agricultural workers.² It must, however, again be emphasised that this material does not allow us to analyse the net balance of migration. To achieve that end it would be necessary to obtain a "Division of Origin" Return from each Division simultaneously. We are here concerned with a one-way traffic into the Midlands; but in one instance it will be possible to do more than this, namely, to estimate the net balance as between the Midlands and South Eastern Divisions.

II

THE VOLUME AND DIRECTION OF THE INFLUX

In July, 1937, there were exchanged in the Midlands 120,823 "foreign" unemployment books belonging to persons aged 14 and under 65 insured under the General and Agricultural Schemes. Before this total is expressed as a proportion of the insured population it is desirable to make certain adjustments. Boys and girls under 16 number

¹ Another reason is that agricultural books have only been in existence since May, 1936, whereas the period during which the General Scheme books can have migrated extends back to 1920. The "rate of absorption" of agricultural books would not, therefore, be on all fours with the general "rate of absorption". The working of the agricultural insurance scheme should make it possible in the future to throw some light on movements in the agrarian labour market.

² If it could have included a classification of the "foreign" books according to industry and a more detailed age analysis, it would have about reached perfection.

The Ministry of Labour has now published an analysis, by sample, of persons aged 21-64 insured under the General Scheme, covering all Divisions, showing the Divisions of original issue of unemployment books and Divisions in which books were exchanged in July, 1937. See *Ministry of Labour Gazette*, September, 1938, pp. 241-3.

2,243, and agricultural workers 2,024. Having deducted these, we arrive at a corrected total of 116,556 "foreign" books belonging to persons aged 16-64 insured under the General Scheme. The total number of books of persons aged 16-64 exchanged in the Midlands in July, 1937, was 2,078,830. From these we have to subtract the 44,560 "Kew" books in as much as they have been excluded from the total of "foreign" books. The "rate of absorption" is then calculated as follows. If f represents "foreign" books (age group 16-64) minus "foreign" agricultural books, and E the total number of books exchanged (age group 16-64) minus "Kew" books, the rate of absorption is expressed by f as a percentage of E .¹

It is of interest to put the result for the Midlands in 1937 alongside that obtained for the London and South Eastern Division in 1936.

"FOREIGN" BOOKS EXCHANGED IN THE MIDLANDS AND LONDON AND SOUTH EASTERN DIVISIONS.

	Midlands Division July, 1937	London and South Eastern Division ² July, 1936
Number of books exchanged	2,034,270	3,723,600
Number of books "foreign" to the Division..	116,556	219,040
Rate of Absorption	5.7%	5.9%

Workers originating in other Divisions comprise 5.7 per cent. of the insured population of the Midlands, while the corresponding figure for the London and South Eastern Division in 1936 was 5.9 per cent. There is a remarkable similarity between these rates of absorption; but a strict comparison would have to take into account the fact that there is access to the Midlands on all sides. The relative attracting power of the South East is really more pronounced than is indicated by these figures.

We may now glance at the distribution of the migrants over the contributing Divisions.

¹ Two minute elements of inaccuracy are here concealed. Neither for the Agricultural Scheme nor for "Kew" books do we know the numbers in the age group 14 and under 16; and it is not legitimate to assume that the proportion of boys and girls in these categories is the same as it is for the insured population as a whole. The discrepancy has, therefore, been ignored: it is far too insignificant to have any detrimental effect on the results.

² This is the old South Eastern Division which then included London. Allowance was made for centrally exchanged and "Kew" books. See *ECONOMICA*, August, 1937, p. 325.

ORIGIN OF "FOREIGN" BOOKS EXCHANGED IN THE MIDLANDS, JULY, 1937¹

	Division of Origin.									Total
	London	South East	South West	North East	North West	North	Scotland	Wales	North. Ireland	
" Foreign " Books (age group 14-15)	189	285	148	448	269	166	126	577	35	2,243
" Foreign " Books (age group 16-64)	11,184	9,580	8,740	23,473	22,300	9,348	10,239	21,108	2,608	118,580
Total " Foreign " Books	11,373	9,865	8,888	23,921	22,569	9,514	10,365	21,685	2,643	120,823
	9	8	7	20	19	8	9	18	2	100
	Percentages of Total.									

For the purpose of showing the origin of the immigrants the definitive total of "foreign" books (age group 14-64, including agriculture) has been used, i.e., 120,823. Three Divisions, the North Eastern, the North Western and Wales, have contributed 20 per cent., 19 per cent. and 18 per cent., respectively, of the aggregate inflow. London and the South East together account for 17 per cent., Scotland 9 per cent., the North (Cumberland, Westmorland, Cleveland, Northumberland and Durham) 8 per cent. and the South West 7 per cent. The predominance of the depressed areas is sufficiently indicated by the fact that over a third of the migrants came from Wales, Scotland and the Northern Divisions.

The number of "foreign" books belonging to boys and girls under 16, namely, 2,243, appears very small. It must, however, be remembered that books for juveniles of this age have only been in existence for a short time, and that a certain number of boys and girls who have migrated either with or without their parents must have taken out insurance books in the Midlands.

The figures for juveniles obtained in this analysis are a serious underestimate of the real volume of migration. The number of juveniles who moved into the Midlands Division

¹ When this Table is compared with the corresponding Table in the previous article (ECONOMICA, August, 1937, p. 327), it will be noticed that the number of Divisions has increased. A new Division, the Northern (covering Cumberland, Northumberland, except Berwick, Durham, Westmorland and the Cleveland district of Yorkshire), has been carved out of the old North Eastern and North Western Divisions. London, too, has become a new Division separate from the South Eastern. Particulars of Divisional boundaries are given in an Appendix to the Annual Report of the Ministry of Labour.

under the Juvenile Transference Scheme in 1936 and 1937 was as follows :

	Boys	Girls	Total
1936	3,489	717	4,206
1937	2,409	613	3,022

Most of these boys and girls took out books only after they had arrived in the Midlands. These figures must not be taken as giving a true indication of the number *absorbed* by the Division, for many of these transferees may have returned home. The majority are, however, missed out of the count of immigrants, for technically theirs are "home" books. It is only those boys and girls who had already started on their industrial careers in other Divisions who qualify for inclusion in the "foreign" category. Deficient though these "exchange of books" figures are, they are nevertheless useful in indicating the general trends of juvenile migration, as will be seen when we proceed to a detailed analysis of age and sex composition.

The streams of migrants may next be considered in relation to the size of the insured populations in the Divisions from which they flow. This information is set out in the following Table :

"FOREIGN" BOOKS IN THE MIDLANDS AS PROPORTION OF INSURED POPULATION IN DIVISION OF ORIGIN (EXCLUDING AGRICULTURE).

Division of Origin	Insured Population (16-64) (Average of 1923, 1929, 1932 and 1936)	Midlands Division	
		"Foreign" Books exchanged July, 1937 (age 16-64)	Influx per 1,000 of Average Insured Population in Division of Origin
London	2,418,000	11,077	5
South Eastern	792,000	9,274	12
South Western	863,000	8,502	10
North Eastern	1,319,000	22,909	17
North Western	2,053,000	22,095	11
Northern	767,000	9,280	12
Scotland	1,309,000	10,181	8
Wales	603,000	20,655	34
Northern Ireland ..	264,000	2,583	10
TOTAL	10,388,000	116,556	11

By far the largest relative contribution has been made by Wales : 34 per thousand of the insured population of the Principality moved into the Midlands during the period. By comparison the relative outflow from the North Eastern Division, 17 per thousand, was only half as much. It is

rather remarkable that the index of relative outflow from the comparatively depressed North Western Division, covering mainly Lancashire and Cheshire, is actually lower than the index for the prosperous South Eastern Division. Both are contiguous areas, and it can hardly be said that a Lancashire man would regard the Midlands as a remote destination. A similar result was obtained in the analysis of migration into London and the South East, when it was found that the North Western Division (which then embraced Cumberland and Westmorland as well) had contributed relatively less even than Scotland, 16 per thousand as against 17 per thousand. The comment I made in that connection was as follows: "it is surprising that relatively so few have left Lancashire: perhaps its outflow has been mainly into the prosperous Midlands."¹ Now we see that this is not borne out by the facts. Actually the South East, where labour has been scarce, has parted with relatively more workers than Lancashire and Cheshire, where a portion of the labour supply has long been redundant. A low degree of mobility seems to be a strong characteristic of the North West, in marked contrast to what has been happening in South Wales. Even Northern Ireland, with an index of 10 per thousand, comes very near to the figure for the North West, while Scotland, with 8 per thousand, does not lag far behind.

There are, however, special considerations relating to the North Western Division which help to explain this result. The large scope for female employment in the cotton industry has the effect of making family unemployment much less severe than the general percentage would suggest. When net advantages are considered from the point of view of the family as a unit, there can be little doubt that the costs of movement for the average household in Lancashire are much higher than in a coal mining area. It is also well known that short-time and under-employment are regarded as in the nature of things in the cotton districts: even in a most severe depression it is not very often that all members of a Lancashire family are out of work at the same time. Conditions are, therefore, materially different from those found in the depressed coalfields.²

As we have taken a census of "foreign" books in the

¹ See *ECONOMICA*, August, 1937, p. 329.

² See an illuminating paper, "Unemployment Statistics—Some Observations upon North Western Figures," by Mr. S. S. Warrington, the Divisional Controller of the Midlands Division, in the *Manchester Statistical Society Group Meetings*, 1935-6, pp. 28-43.

South East in 1936 and in the Midlands in 1937, we shall not be guilty of much error if we combine the results. It affords an opportunity of gauging how much movement of insured labour there has been since the War from the northerly and western parts of the country to the southerly regions where the expanding industries have predominated.

Division of Origin	Migration to Midlands Division 1920-37	Migration to South Eastern Division (including London) 1920-36	Index of Gross Outflow to Midlands and South East
Percentage of Average Insured Population ¹ of Division of Origin			
Wales	3.4	6.7	10.1
South Western	1.0	4.0	5.0
North Eastern	1.3	2.2	3.5
North Western			
Northern			
Scotland	0.8	1.7	2.5

These figures show that no less than 10 per cent. of the insured workers of Wales have been absorbed by the Midlands and the South East since 1920. Even as it stands this index represents a high degree of mobility, but it doubtless underestimates the real extent of the transference. As most of the migrants are in the lower or middle age groups, we would get a truer impression of the real effect on Wales if we could express the movement as a proportion of the industrially active section of the labour supply of the Principality, say, insured workers between the ages of 16 and 49.² The nearest approximation is to take the average number in employment for the years 1923, 1929, 1932 and 1936; and on this base the efflux from Wales to the South East and the Midlands works out at 13.2 per cent.

The transference from the South Western Division to the Midlands has not been striking. The main stream of movement from those counties, as always, appears to be in the direction of London. The three northerly Divisions have to be taken together owing to changes of boundary consequent on the establishment of the Northern Division. Their combined index of gross outflow stands at 3.5 per cent. which is only a third of that of Wales. One reason for the lowness of this figure is the inclusion in it of Lancashire

¹ This base is the average insured population for 1923, 1929, 1932 and 1936.

² Since this was written an age-analysis of insured workers by division at July, 1937, has been published in the *Ministry of Labour Gazette*, August, 1938, p. 320.

and Cheshire: if the data for Northumberland, Durham, Cumberland and Yorkshire could be given separately they would yield a higher index. Scotland, with its 2.5 per cent., ranks not very much below the northerly Divisions.

With the information supplied by our two censuses, it is possible to give an approximate indication of the net balance of migration of insured labour as between the Midlands and the London and South Eastern Divisions. In July, 1937, there were in the Midlands 20,351 "foreign" books (age group 16-64) which had originated in London and the South East: in July, 1936, there were in the London and South Eastern Division 26,846 "foreign" books belonging to the same age group which had originally been issued in the Midlands. If we ignore the interval of a year between the two census dates, we may conclude that there was a net balance of around 6,500 in favour of London and the South East.¹ There has been an almost even amount of give and take as between the two prosperous regions. The pull of the Midlands was strong enough to reduce the gross gain of 26,800 by London and the South East to a net figure of about 6,500.

III

ANALYSIS BY AREA

So far we have been concerned with the Midlands as a whole. The next step is to see how the Division has fared in its separate parts and also to examine the age- and sex-composition of the migrants. Grouping together various Exchange areas must necessarily be a somewhat arbitrary procedure, and the utility of any particular regional separation depends on the purpose for which it is intended. In the present case we are interested in splitting up the Division into areas which will each reflect an important aspect of the economic life of the Midlands. It has been thought appropriate to allocate the Employment Exchanges to the following eight areas:²

- (1) The City of Birmingham ;
- (2) The Potteries ;
- (3) The Black Country ;
- (4) Coventry and North Warwick ;

¹ To be accurate, of course, we should be using a 1937 total of "foreign" books for London and the South East. But, as these censuses reveal migration which has been taking place over a period going back to 1920, an interval of a year between the two census dates cannot matter very much. The estimate in the text does not claim to be more than an intelligent guess as to trends.

² The precise composition of these areas is given on p. 434.

- (5) The Western Area—the counties of Salop, Hereford and the bulk of Worcestershire ;
- (6) The Eastern Area—South Warwick, Northampton, Huntingdon, Rutland and part of Lincolnshire.
- (7) The counties of Nottingham and Derby ;
- (8) Leicestershire.

The characteristics of these areas do not require extensive comment. The Potteries cover mainly Stoke, Burslem, Hanley and Longton, with an insured population of 124,000. The chief industries are pottery, bricks and glass, with some coal-mining and metal manufacture. Prominent in the Black Country are Wolverhampton, Smethwick, Walsall and West Bromwich. This area, like Birmingham itself, concentrates on engineering, metal and electrical products, while there is also some mining and textiles. In Coventry and North Warwick we find the centre of vigorously expanding industries, particularly motor vehicles, cycles and aircraft. Whereas the Western area, covering Salop, Hereford and part of Worcestershire, is mainly agricultural, the largest town being Shrewsbury, the Eastern area includes Northampton and Peterborough as well as the new iron and steel community at Corby. Most of the coal mining in the Division is to be found in Notts and Derby, where there is also hosiery, artificial silk and miscellaneous metal. Finally, we have Leicestershire, with its boot and shoe, hosiery and general engineering trades in the city, a fringe of mining at Coalville and, for the rest, agriculture.

The insured population and the proportion of "foreign" books exchanged in these areas in July, 1937, are shown in the following Table :

RATE OF ABSORPTION BY AREA (JULY, 1937, RETURN)
(EXCLUDING AGRICULTURAL BOOKS).

Area	Insured Population (16-64)	" Foreign " Books (16-64)	Rate of Absorption
			%
Birmingham	437,951	28,708	6.6
Potteries	201,620	4,703	2.3
Black Country	348,804	11,166	3.2
Coventry and N. Warwick	155,839	18,429	11.8
Western	117,222	8,156	6.8
Eastern	129,994	12,726	9.8
Notts and Derby	448,263	24,027	5.4
Leicestershire	194,577	8,641	4.4
Midlands	2,034,270	116,556	5.7

These results may best be dealt with in conjunction with Table I in the Appendix which sets out the Division of Origin of the "foreign" books exchanged in each area. Coventry and North Warwick has the highest rate of absorption, 11.8 per cent., which is a little over twice that of the Division as a whole. The rate at Coventry itself is 13.5 per cent. and at Rugby 16.8 per cent., indicating that these two towns have been importing labour on a substantial scale. Just over a fifth of all the migrants to this area have come from Wales, namely, 4,044; and Scotland contributed as much as 12.6 per cent. The next in order of absorbing power is the Eastern area, with 9.8 per cent., a figure which is, however, partly the result of the proximity of Peterborough, Stamford and Huntingdon to the divisional boundary, the influx being mainly from the South East, London and the North East. But there is another important reason. Corby recorded no less than 2,875 "foreign" books, an absorption rate of 49.2 per cent., comprising nearly a quarter of the immigrants to the Eastern area. Two-thirds of the newcomers to this mushroom township came from Scotland—a result of the planned migration which accompanied the location by Stewarts and Lloyds of their new iron and steel plant. Only a few years ago the Office of the Ministry of Labour at Corby had a very rustic appearance, and the officials had never seen a steel erector. To-day the number insured at that Exchange is over 6,000 persons, the majority of whom gain their livelihood in the local steel works. Numerous families, complete with shopkeepers and even hairdressers, moved *en masse* from the Motherwell district, and recreated in this corner of Northamptonshire a vigorous and thrifty Scottish community.

The predominantly agricultural region on the western fringe has shown itself capable of taking a fair proportion of outsiders. Its index of 6.8 per cent. does not take into account books belonging to the Agricultural Scheme, so that we are dealing with movement from other industries; and it is not unnatural that 43 per cent. of it should be traceable to Wales, the inflow from that quarter being particularly evident in places like Worcester, Kidderminster, Hereford and Oswestry. No doubt, there has been an overflow from the depressed valleys of Monmouthshire into Herefordshire; but in addition, many country folk must have crossed Offa's Dyke from the counties of mid-Wales.

We now come to the City of Birmingham, with an insured population of 438,000 and an absorption rate of 6.6 per cent. The larger factories are to be found mostly on the outer fringe, whereas in the centre of the city there are thousands of small employers. We cannot, however, analyse the distribution of migrants over the city, as it is impossible to deduce the area where a workman resides from the Office where his book is exchanged.

The largest of our areas is Notts and Derby, with an insured population of nearly half a million. Its rate of intake of labour is, however, comparatively moderate, namely, 5.4 per cent. Almost half the immigrants have been drawn from the North Eastern Division, about a fifth from the North Western, and only 6 per cent. from Wales. Considering that the divisional boundary on the north eastern flank artificially cuts through a large industrial region, we may reasonably conclude that much of the inflow was of a short-distance character. Moreover, the coalfield, though the most profitable in the Kingdom, has not been sufficiently buoyant to absorb many from other less fortunate mining areas, a fact which is clearly brought out by the results for the following group of Exchanges.

Office	Insured Population (16-64)	Approximate Number of Coal Miners	Number of "Foreign" Books (16-64)	Rate of Absorption
				%
Alfreton	7,133	3,800	109	1.5
Bolsover	6,244	5,700	340	5.4
Clay Cross	4,799	3,000	70	1.5
Heanor	11,953	6,000	154	1.3
Ilkeston	17,514	10,000	181	1.0
Mansfield	32,184	12,000	1,134	3.5
Measham	4,769	3,200	58	1.2
Shirebrook	4,170	3,500	328	7.9
Staveley	10,956	6,000	631	5.8
Sutton-in-Ashfield ..	23,415	14,700	601	2.6
Worksop	15,257	10,600	2,035	13.3
Total	138,394	78,500	5,641	4.1

The combined rate of absorption for these coal mining Exchanges is only 4.1 per cent.; and, were it not for the high figure for Worksop, which includes part of Yorkshire, the index would be much lower. There is, however, one outstanding exception, not included in the above group: Eckington returned 2,491 "foreign" books, comprising 41.6 per cent. of the total number exchanged there. But

hardly any of this is real migration owing to the location of the Exchange right on the border. One would have expected a greater volume of movement into the Notts and Derby coalfield than appears to have actually taken place. It is possible that the demand for labour in the more prosperous parts has been adequately satisfied by drawing upon the surplus miners attached to the uneconomic pits, the kind of internal readjustment which has been observed in South Wales.¹

Leicestershire, with a "foreign" proportion of 4.4 per cent., presents no noteworthy feature. Two-thirds of the immigrants are located in the city of Leicester; but there does not seem to be much demand for outside labour. The lowest propensity to attract migrants is shown by the Potteries (2.3 per cent.) and the Black Country (3.2 per cent.). Only 4,703 have found their way into the former area, which has an insured population of 200,000; and one out of every two crossed over from the neighbouring counties of Lancashire and Cheshire. The labour market in the Potteries seems to be pretty lifeless, partly no doubt the result of conservatism and internal recruitment associated with an old industry like pottery. The Black Country, on the other hand, approximates more to Birmingham, with Welshmen again to the fore, making up 28 per cent. of the migrants.

To sum up, we may note that Birmingham has absorbed a quarter of all the immigrants, Notts and Derby one-fifth, Coventry and North Warwick one-seventh, the Black Country and the Eastern area about one-tenth each, the remaining fifth being shared between Leicestershire, the Western area and the Potteries.

IV

ANALYSIS BY AGE AND SEX

One of the unique features of the Return of "foreign" books for the Midlands is that it contains information about the age- and sex-composition of the migrants. The particulars of age fall short of sub-dividing the group aged 21 to 64; nevertheless there are some details about persons under 21. It must be borne in mind that this is an examination of insured labour only; the proportions of females to males and youth to middle age would be materially

¹ See the present writer's article, "Labour Mobility in the South Wales and Monmouthshire Coalmining Industry, 1920-30," *Economic Journal*, June, 1931, pp. 216-26.

different if we could include persons not covered by the unemployment insurance system, e.g., domestic servants, teachers, nurses, professional workers earning more than the insurance income limit, wives, juvenile and aged dependants.

The data are set out in Tables II, III and IV of the Appendix. In Table II the figures for each area are split so as to reveal the number of adult men and women (21 and over), young men and women (18-20), boys and girls (14-17). The movement into the Division as a whole is made up as follows : adult males 78 per cent., adult females 9 per cent., young men and boys 10 per cent., young women and girls 3 per cent. The proportion of adult males is highest in Notts and Derby (84.3 per cent.) and lowest in the Black Country (67.0 per cent.), where boys and young men are relatively numerous. There does not seem to be any scope in the Potteries for the absorption of youthful workers; and it is a peculiarity of this area which, as we have seen, has the weakest attracting power, that of the few who did settle there as many as 13 per cent. were adult women. Three-quarters of these came from Lancashire and Cheshire, and it may be deduced that they were women from the depressed cotton districts. Here is at least some tendency for part of the surplus female labour supply of Lancashire to transfer itself to a neighbouring district, but unfortunately the weak state of general demand there sets an early limit to this process. The wealth of possibilities for juveniles in Birmingham is evidenced by the fact that one-third of the youths (18 and under 21) and 28 per cent. of the young women of the same age who migrated to the Midlands are to be found in the city.

The information regarding sex ratios in Table III shows that females comprised 12 per cent. of the insured workers from all Divisions who entered the Midlands. Women are relatively twice as numerous among the migrants from London and the South East as they are among those from Wales, Northumberland and Durham. The metropolis and the Principality are at opposite extremes, the former with a female proportion of 18.1 per cent. and the latter one of 7.1 per cent. Lancashire and Cheshire, as could be expected, also have a high ratio. These indices naturally reflect to a great extent the relative scope for women's employment in the contributing Divisions. There are one or two further points of interest arising from Table III. The proportion of

women coming from the North Western Division is double the proportion who left Wales; and yet, when we look at the Eastern area, it is curious to find that 16.1 per cent. of the Welsh immigrants are women compared with only 9.9 per cent. among the people from Lancashire and Cheshire. The absolute numbers are, it is true, small; yet it appears to be an indication of the relative immobility of Lancashire women contrasted with the movement of Welsh women to places as far distant as Northampton, Kettering and Wellingborough. Another example of the mobility of female labour is to be seen in the Scottish incursion into Coventry and North Warwick.

Finally, we turn to Table IV, giving the relative numbers and sex-composition of the younger migrants into each area. Persons under 21 make up 13.3 per cent. of the influx into the Midlands, 10 per cent. being males and 3.3 per cent. females. This time the Black Country and the Potteries are at opposite poles. No less than 25 per cent. of the intake of workers in the Black Country are under 21, whereas in the Potteries the corresponding proportion is only 6.6 per cent. The relative number of young females in the migratory stream is fairly even in all areas, with the exception of the Eastern area where it is appreciably higher than the average owing to an unusually heavy recruitment from Wales. And this leads to a consideration of the differences in the trends of juvenile migration from the various Divisions. A general feature of the movement from the South East, London and the South West is that it contains comparatively more young females than that from Wales and the northerly Divisions. This is particularly noticeable in Birmingham and the Black Country. In the latter area the proportion of young males among the migrants from Scotland, Wales and the Northern Division is in the region of 30 per cent. compared with about 14 per cent. in the case of London and the South East. The younger element in the efflux from the North Eastern and North Western Divisions is distinctly small. In the absence of data about the age-composition and the occupational distribution of the migrants over 20 years of age, it is impossible to generalise. Taking the Midlands as a whole, we are not justified, on the basis of our figures, in suggesting that there is much difference between the age structure of the movement from the older industrial regions and that of the overflow from the newer

industrial South. Wales, Lancashire and perhaps Northern Ireland have peculiar characteristics of their own; and it has been shown that there are inherent divergences between the areas which make up the Midlands.

V

CONCLUSION

This inquiry furnishes evidence that parts of the Midlands, e.g., Coventry and Birmingham, have experienced expansion comparable to that of certain areas in the South East and especially Greater London. What is particularly interesting is that considerable absorbing power has been shown by a number of independent centres scattered over the Division, e.g., Rugby, Corby and Newark, which is a reminder of the result obtained for the "country towns" in the analysis of the South East.¹ There seems to be a decentralisation of industry going on: sometimes old towns acquire a new lease of life, and in other cases, such as Corby, a completely new community springs into being. The population, under the influence of new forces, is redistributing itself in a manner which promises less congestion in a few areas than in the past; and it is desirable that this tendency should be encouraged.

The impression that the movement of labour in the country as a whole is a one-way traffic from the depressed to the prosperous regions is not accurate. We have observed an almost balanced two-way traffic between the Midlands and the South Eastern Divisions. Even with the advance of mass production and standardisation in the expanding industries, the labour supply is hardly less heterogeneous in quality than it is in the trades which cling more tenaciously to older methods. A study of the engineering industry gives ample proof of this. It is a sign of economic virility that there should be a wide interchange of labour as between the different sections of the prosperous zone.

The Midlands Division, however, is not without areas where prosperity is less marked, for example, the Potteries, the coalfields and parts of the Black Country. These are probably losing labour to the expanding districts. The Notts and Derby coalfield has much better prospects than South Wales or Durham, but it does not seem to be doing anything to redress the balance within the industry

¹ See *ECONOMICA*, August, 1937, p. 333.

as a whole. The only district in the Kingdom where miners from depressed areas have been absorbed in appreciable numbers into colliery employment is the Kent coalfield.

The low mobility of labour in Lancashire and Cheshire compared with the huge efflux from Wales has been commented upon ; and there is reason to conclude that migration from South Wales has passed the optimum whereas in Lancashire it is far from having reached it. Emphasis must be laid on the differences between these two areas ; and, as we have seen, there are special factors, peculiar to the cotton communities, which go a long way to explain the stickiness observed there. Recent research has revealed only too clearly the damaging effect of large-scale emigration on the age-composition and quality of the labour supply in the most depressed areas. Unregulated internal migration has threatened to drain Wales of its youthful and adaptable workers while doing very little to cure the problem of redundancy in Lancashire. It is to be hoped that the Royal Commission on the Geographical Distribution of the Industrial Population will consider ways and means of meeting these maladjustments.

Some of the movement we have analysed has been State-assisted, through the media of schemes of transference for adults and juveniles and family and household removal. We are told that the slightest inducement makes many of the transferees return to their homes, as they fail to adapt themselves to their new environment. We certainly need more information as to how the migrants settle down. To what extent, for example, has there been genuine infiltration, that is to say, settlement, not in new groups, but as part of the normal life and society of the district ? There is an urgent need for social and economic surveys to be undertaken in the industrial communities which have been rapidly expanding, for example, Coventry, parts of Birmingham and the north western sector of Greater London. There is no excuse for a blind repetition of the iniquities of "development" which scarred the face of many an industrial community in the generation before the War.

Finally, attention needs to be directed to the paucity of statistical information on the internal movements of labour. The Ministry of Labour has done much to fill the gaps. It should not be utopian, however, to expect the Population Census to devote at least one section to this

important subject. Neither in 1931 nor in 1921 did our Census publish an analysis of the Birth-places of the Population; but it is to be hoped that, when the preparations for the 1941 Census come to be made, the authorities will see fit to reintroduce this section on the lines of the admirable analysis published as part of the 1911 Census.

APPENDIX
TABLE I.
ORIGIN OF "FOREIGN" BOOKS (14-64) EXCHANGED IN THE MIDLANDS DIVISION, JULY, 1937 (INCLUDING AGRICULTURAL SCHEME).

Area	Division of Origin									Total
	London	South East	South West	North East	North West	North-ern	Scotland	Wales	Northern Ireland	
Birmingham	2,776	2,072	2,598	2,805	6,550	1,729	2,287	6,954	1,551	29,322
Potteries	350	276	217	783	2,399	122	226	371	34	4,778
Black Country	1,132	940	838	1,565	1,728	1,009	1,054	3,298	126	11,690
Coventry and North Warwick	1,314	1,400	1,335	2,010	3,271	2,533	2,364	4,044	551	18,822
Western	631	497	1,252	646	1,537	163	307	3,845	63	8,941
Eastern	2,379	2,697	731	2,339	1,323	844	2,457	862	135	13,767
Notts and Derby	1,762	1,257	1,002	11,520	4,629	1,869	970	1,428	94	24,531
Leicestershire	1,029	726	915	2,253	1,132	1,245	700	883	89	8,972
Midlands	11,373	9,865	8,888	23,921	22,569	9,514	10,365	21,685	2,643	120,823

Area		Division of Origin								Total	
		London	South East	South West	North East	North West	North-ern	Scotland	Wales		Northern Ireland
Percentage of Area Total contributed by each Division											
Birmingham	..	9.4	7.1	8.9	9.6	22.3	5.9	7.8	23.7	5.3	100
Potteries	..	7.3	5.8	4.5	16.4	50.2	2.6	4.7	7.8	0.7	100
Black Country	..	9.7	8.0	7.2	13.4	14.8	8.6	9.0	28.2	1.1	100
Coventry and North Warwick	..	7.0	7.3	7.1	10.7	17.4	13.5	12.6	21.5	2.9	100
Western	..	7.1	5.6	14.0	7.2	17.2	1.8	3.4	43.0	0.7	100
Eastern	..	5.3	19.6	5.3	17.0	9.6	6.1	17.8	6.3	1.0	100
Notts and Derby	..	7.2	5.1	4.1	47.0	18.8	7.6	4.0	5.8	0.4	100
Leicestershire	..	11.5	8.1	10.2	25.1	12.6	13.9	7.8	9.8	1.0	100
Midlands	..	9.4	8.2	7.4	19.7	18.7	7.9	8.6	17.9	2.2	100

[illegible]

TABLE II.
AGE AND SEX COMPOSITION OF MIGRANTS.

Area	Men 21 and over	Young Men 18 and under 21	Boys 14 and under 18	Women 21 and over	Young Women 18 and under 21	Girls 14 and under 18	Total
Birmingham	21,812	2,146	1,379	2,957	568	460	29,322
Potteries ..	3,834	111	95	628	57	53	4,778
Black Country ..	7,836	1,167	1,395	906	220	166	11,690
Coventry and North Warwick ..	14,840	1,049	812	1,505	366	250	18,822
Western ..	7,274	286	330	821	99	131	8,941
Eastern ..	10,626	568	640	1,241	269	423	13,767
Notts and Derby ..	20,687	775	651	1,886	277	255	24,531
Leicestershire ..	7,120	338	354	871	141	148	8,972
Midlands ..	94,029	6,440	5,656	10,815	1,997	1,886	120,823
Percentages of Area Total							
Birmingham	74.4	7.3	4.7	10.1	1.9	1.6	100
Potteries ..	80.3	2.3	2.0	13.1	1.2	1.1	100
Black Country ..	67.0	10.0	11.9	7.7	1.9	1.5	100
Coventry and North Warwick ..	78.9	5.6	4.3	8.0	1.9	1.3	100
Western ..	81.3	3.2	3.7	9.2	1.1	1.5	100
Eastern ..	77.2	4.1	4.6	9.0	2.0	3.1	100
Notts and Derby ..	84.3	3.2	2.7	7.7	1.1	1.0	100
Leicestershire ..	79.4	3.8	3.9	9.7	1.6	1.6	100
Midlands ..	77.8	5.3	4.6	9.0	1.7	1.6	100

TABLE III.
SEX COMPOSITION OF MIGRANTS BY AREA AND DIVISION OF ORIGIN.

Area	Division of Origin Females as Percentage of Migrants from each Division									All Divisions
	London	South East	South West	North East	North West	Northern	Scotland	Wales	Northern Ireland	
Birmingham	19.7	17.5	17.0	16.6	15.3	9.5	10.5	8.3	12.1	13.6
Potteries	19.4	14.1	9.7	8.0	20.2	9.8	6.2	8.9	11.8	15.4
Black Country	18.5	16.3	16.0	11.1	13.7	9.1	9.5	5.6	7.9	11.0
Coventry and North Warwick ..	17.1	13.9	11.1	13.2	15.2	9.0	12.8	4.7	12.5	11.2
Western	19.0	20.1	15.7	12.2	14.7	12.3	10.8	7.2	1.6	11.8
Eastern	16.0	20.5	13.0	14.7	9.9	10.5	7.9	16.1	6.7	14.1
Notts and Derby	15.9	13.8	15.0	7.4	14.2	7.0	9.6	4.8	11.7	9.8
Leicestershire	20.7	14.6	11.3	11.0	12.5	15.0	9.6	9.1	15.7	12.9
Midlands	18.1	17.1	14.5	10.5	15.0	9.7	10.0	7.1	11.5	12.3

TABLE IV.

RELATIVE NUMBER AND SEX COMPOSITION OF MIGRANTS UNDER 21 BY AREA AND DIVISION OF ORIGIN.

Area	Age Group 14-20	Division of Origin.									All Divisions
		Age group 14-20 as % of Total Migrants from each Division in each Area									
		London	South East	South West	North East	North West	North-ern	Scotland	Wales	Northern Ireland	
Birmingham	Males	8.0	11.3	8.9	10.1	13.1	12.7	10.7	14.2	16.1	12.2
	Females	4.4	3.5	5.0	3.7	3.3	2.9	2.5	3.3	2.5	3.5
	M. & F.	12.4	14.8	13.9	13.8	16.4	15.6	13.2	17.5	18.6	15.5
Potteries	Males	5.1	4.7	5.1	3.4	4.6	1.6	0.4	4.6	17.6	4.3
	Females	2.9	1.1	0.5	1.0	3.3	0.8	—	1.6	2.9	2.3
	M. & F.	8.0	5.8	5.5	4.5	7.9	2.4	0.4	6.2	20.5	6.6
Black Country	Males	13.6	14.3	11.1	22.8	12.7	33.9	29.6	28.4	10.3	21.9
	Females	5.1	5.6	5.8	3.0	2.8	2.9	3.8	1.7	4.7	3.3
	M. & F.	18.7	19.9	16.9	25.8	15.5	36.8	33.4	30.1	15.1	25.2
Coventry and North Warwick ..	Males	8.2	7.4	6.7	8.1	5.7	9.9	11.1	15.7	11.4	9.9
	Females	3.7	3.4	3.7	3.9	2.9	3.2	5.0	2.1	2.7	3.3
	M. & F.	11.9	10.8	10.5	11.8	8.6	13.1	16.1	17.8	14.2	13.2

Western	..	..	Males Females	5·4 2·9	5·8 2·0	6·9 2·4	8·4 2·9	5·3 2·4	7·4 4·9	5·2 3·3	7·8 2·5	3·2 1·6	6·9 2·6
			M. & F.	8·3	7·8	9·3	11·3	7·7	12·3	8·5	10·3	4·8	9·5
Eastern	..	..	Males Females	7·0 3·4	9·2 9·4	7·1 3·3	7·7 3·5	5·4 2·6	14·1 5·7	7·3 2·3	21·6 12·8	5·2 2·2	8·8 5·0
			M. & F.	10·4	18·6	10·4	11·2	8·0	19·8	9·6	34·4	7·4	13·8
Notts and Derby	..	..	Males Females	6·5 2·4	6·4 2·5	6·2 2·7	6·7 1·9	3·9 2·8	5·0 1·9	4·9 1·6	4·8 2·0	2·1 —	5·8 2·2
			M. & F.	8·9	8·9	8·9	8·7	6·7	6·9	6·5	6·8	2·1	8·0
Leicestershire	..	..	Males Females	5·3 4·9	5·4 3·2	4·3 2·8	7·3 2·2	5·7 2·4	11·2 4·3	9·6 3·6	12·9 3·9	10·1 2·2	7·7 3·2
			M. & F.	10·2	8·6	7·1	9·5	8·1	15·5	13·2	16·8	12·3	10·9
Midlands Division	..	..	Males Females	7·6 3·8	9·0 5·0	7·5 3·8	8·4 2·5	7·8 3·0	9·7 3·2	10·9 3·1	15·0 3·0	13·3 2·5	10·0 3·3
			M. & F.	11·4	14·0	11·3	10·9	10·8	12·9	14·0	18·0	15·8	13·3

MIDLANDS DIVISION.
COMPOSITION OF THE AREAS.

Area	Employment Exchanges (including Juvenile Employment Bureaux).
Birmingham	Aston, Birmingham, Handsworth, Selly Oak, Sparkhill, Washwood Heath.
Potteries	Stoke, Burslem, Hanley, Longton, Audley, Biddulph, Burton, Cheadle, Kidsgrave, Leek, Newcastle-under-Lyme, Stafford, Stone, Uttoxeter.
Black Country	Bilston, Brierley Hill, Cannock, Cradley Heath, Darlaston, Lichfield, Rugeley, Smethwick, Tamworth, Tipton, Walsall, Wednesbury, West Bromwich, Willenhall, Wolverhampton, Dudley, Oldbury, Stourbridge, Halesowen.
Coventry and North Warwick	Atherstone, Bedworth, Coleshill, Coventry, Southam, Kenilworth, Kineton, Leamington, Nuneaton, Rugby, Sutton Coldfield.
Western	Bromsgrove, Droitwich, Evesham, Kidderminster, Malvern, Pershore, Redditch, Stourport, Tenbury, Worcester, Bishop's Castle, Bridgnorth, Church Stretton, Cleobury Mortimer, Ellesmere, Ironbridge, Ludlow, Market Drayton, Newport, Oakengates, Oswestry, Shrewsbury, Wellington, Wem, Whitchurch, Bromyard, Hereford, Ross, Kington, Ledbury, Leominster.
Eastern	Alcester, Stratford, Corby, Daventry, Desborough, Irthlingborough, Kettering, Northampton, Oundle, Raunds, Rushden, Thrapston, Towcester, Wellingborough, Wollaston, Huntingdon, March, Chatteris, Peterborough, Stamford.
Notts and Derby	Alfreton, Arnold, Basford, Beeston, Belper, Bolsover, Borrowash, Chesterfield, Clay Cross, Derby, Eckington, Heanor, Hucknall, Ilkeston, Long Eaton, Mansfield, Measham, Netherfield, Nottingham, Retford, Ripley, Shirebrook, Staveley, Sutton-in-Ashfield, Swadlincote, Worksop, Ashbourne, Bakewell, Matlock, Wirksworth, Newark, Ruddington, Southwell.
Leicestershire ¹	Ashby-de-la-Zouch, Castle Donington, Coalville, Fleckney, Hinckley, Leicester, Loughborough, Lutterworth, Market Harborough, Melton Mowbray, Ratby, Shepshed, Sileby, Oakham.

¹ Including Oakham in Rutlandshire.

Commodity Stocks in the Trade Cycle

By L. M. LACHMANN and F. SNAPPER.

I

IN this paper we endeavour to make use of the statistics of commodity stocks in order to throw some light upon the Trade Cycle and the issues arising from it.

Our main problem is: Do commodity stocks move in positive or inverse correlation with the Cycle? Important issues as to the momentum of the "cumulative process" hinge upon the answer to this question. For, in the case of positive correlation, investment in commodity stocks would be an important accelerating force in the mechanism of booms and depressions, tending to make any increase in investment activity somewhere in the economic system the impelling force of a cumulative process. By analogy, in the case of inverse correlation changes in the size of stocks would be a retarding force.

It would, of course, be most desirable to be able to make use of statistics of the stocks of finished as well as of unfinished goods. For then it might be possible to say something about the relative size of stocks at different stages of production in different phases of the Cycle, a very important problem to all those who, unyielding to the attractions of "macrodynamics", refuse to see in crises simply fluctuations in total investment. Unfortunately, we have at our disposal statistics of unfinished commodities only.¹ There is, however, reason to believe that the stocks of finished products move in positive correlation with the cycle, because they are kept by producers and merchants as a constant percentage of turnover.

We thus shall have to confine ourselves to the study of raw material stocks and try to find out what light they throw upon the Trade Cycle. So far, Mr. Keynes has been the only one to formulate a precise and logical theory of the cyclical fluctuations in commodity stocks.² According

¹ There are a few statistics of stocks of finished products, but they are not very satisfactory, e.g.: U.S.A., *Survey of Current Business*, Annual Supplement, 1936, p. 10.

S. Kuznets, *National Income and Capital Formation*, New York, 1937, p. 40, table 10, No. 2c "changes in business inventories", and p. 120 (for steel sheets).

Jan Tinbergen in *De Nederlandsche Conjunctuur*, March, 1933, pp. 11-20.

² J. M. Keynes, *A Treatise on Money*, Vol. II, ch. 29, "Liquid Capital". Also *General Theory of Employment, Interest and Money*, pp. 318-19.

to him, "surplus stocks" must be cleared before recovery is possible, and therefore the depletion of stocks during the depression is a subsidiary force of disinvestment. We shall have to examine this thesis in the light of the statistical facts. On the other hand, if it can be shown that stocks as a rule reach their lowest level immediately before the outbreak of the crisis, this may conceivably give some indication of the causes of the latter. It would purport to show that the point at which "surplus stocks" are exhausted is not the lower, but the upper turning point of the cycle.

II

We present below two tables of statistics of movements in stocks of certain raw materials and foodstuffs, the first referring to the pre-war period and the second to the years 1919-37.

TABLE I

End of Year	Pig Iron North of England ooo tons (2)	End of Year	Pig Iron North of England ooo tons (2)	Copper in in Europe U.S.A. ooo tons (1)		Tin ooo tons (3) (4)	Wheat ooo,ooo bushels (6)	Cotton oooo bales 1 Aug. (5)
1869	116	1885	517	—		16	—	134
1870	118	1886	652	47		14	—	144
1871	68	1887	637	56		19	—	147
1872	42	1888	473	35		19	—	129
1873	80	1889	262	96		17	—	132
1874	90	1890	256	95		14	126	108
1875	74	1891	263	62		16	175	174
1876	182	1892	164	53		19	194	282
1877	271	1893	163	52		20	206	226
1878	337	1894	216	43		30	200	213
1879	283	1895	306	51		36	186	320
1880	331	1896	163	43		40	151	193
1881	378	1897	97	31		35	126	192
1882	266	1898	138	27		24	113	324
1883	253	1899	71	22		21	160	400
1884	302	1900	44	28		21	163	246
		1901	139	22		26	169	267
		1902	121	16		17	142	267
		1903	97	13		17	133	292
		1904	199	16		17	146	277
		1905	707	13		16	140	504
		1906	537	17		16	151	418
		1907	89	20		15	127	569
		1908	132	57	57	23	132	458
		1909	385	109	66	23	96	568
		1910	519	84	55	20	132	473
		1911	526	57	41	19	185	484
		1912	241	40	48	14	—	681
		1913	230	21	41	16	—	636

TABLE II

End of Year	Copper		Tin ooo tons (3) (4)	Zinc ooo tons (3) (7)	Sugar ooo tons 1 Oct. (3)	Wheat ooo,ooo bushels (6)	Cotton oooo bales 1 Aug. (5)	Rubber ooo tons (3) (8) (9)
	in Europe ooo tons (1)	in U.S.A. ooo tons (2)						
1919	18	546	20	61	—	347	675	—
1920	20	587	18	81	1338	317	634	281
1921	23	427	24	72	2039	238	968	296
1922	33	344	26	20	868	285	562	358
1923	37	409	21	34	791	339	338	306
1924	51	374	25	42	542	363	276	233
1925	65	322	18	9	2500	323	327	234
1926	48	358	16	20	1919	378	550	311
1927	14	330	16	38	1780	400	784	334
1928	10	315	25	42	1850	565	521	301
1929	12	439	28	75	4047	583	452	382
1930	12	585	42	144	5522	583	619	505
1931	34	722	51	130	7022	608	897	644
1932	48	747	45	125	7099	598	1326	641
1933	39	673	23	106	6264	539	1181	668
1934	69	567	13	120	5396	516	1070	724
1935	104	496	12	84	4128	487	909	637
1936	63	377	20	45	2983	318	696	473
1937	42	505	20	79	3102	346	624	496

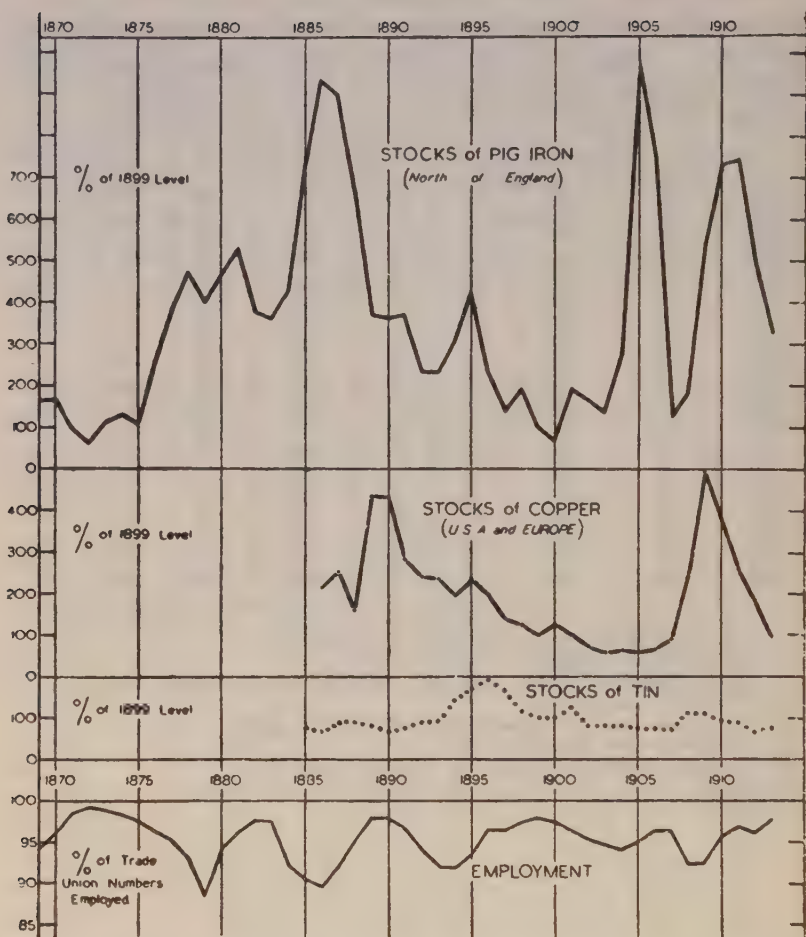
(1) *Year Books of the American Bureau of Metal Statistics.*(2) *Monthly Trade Supplement of the Economist.*(3) *Special Memoranda of the London and Cambridge Economic Service, Nos. 32 and 45.*(4) *World Tin Statistics, 1938.*(5) *Cotton Year Book of the New York Cotton Exchange, 1937.*(6) *Broomhall's Corn Trade Year Books.*(7) *Statistische Zusammenstellungen der Metallgesellschaft.*(8) *London and Cambridge Economic Service, May Bulletin, 1938.*(9) *Special Memorandum No. 32, table on p. 19.*

III

Economists before the war assumed that Sauerbeck's Index Numbers were a fairly good barometer of the General Trade Cycle. Now there is reason to believe that for the period before the war this contention holds true, although we prefer a production index which is derived from the English unemployment figures. We do not need to explain why certainly after the war the American production index is greatly preferable.

The movements of agricultural raw materials require, however, a separate explanation. We observe that during the period 1873-1913, whereas the general trade cycle reaches its peak in 1881, 1891, 1900, 1907 and 1913, the index numbers of prices of foodstuffs behave somewhat

Chart I



differently. The peaks of this cycle are in the years 1877, 1891, 1900 and 1912. At first sight it may seem that agricultural production as a whole has a cycle of its own, which consists of two components: the general industrial cycle and changes in natural conditions. By natural conditions we mean all those atmospheric and climatic factors which influence the size of crops.¹ The absence of a production function in the strict sense, i.e., the fact that in agriculture

¹ Some writers have attributed these changes to sun spots. They believe that there is a sun spot cycle of about 11 years, which causes a cyclical fluctuation in the size of the crops. Among the outstanding writers who have taken this view are W. Stanley Jevons and Mr. S. de Wolff. The latter in his book, *Het Economisch Getij*, states that there is a longer cycle of 45 years too. Mr. D. H. Robertson (*A Study of Industrial Fluctuations*) mentions this theory without committing himself.

output quantities are not uniquely correlated with input quantities, makes the supply of agricultural produce a relatively independent variable at least in the short period, when acreage and methods of cultivation are given. Hence, if there are cyclical fluctuations in the size of output per acre this would be a sufficient condition for a separate agricultural cycle. So much for the supply side.

On the demand side, of course, the agricultural cycle is linked up with the general trade cycle. Industrial demand for agricultural raw materials depends, of course, on the state of trade. The demand for agricultural produce for consumption is governed by the level of income and employment unless the income elasticity of demand is very low. It is clear, e.g., that fluctuations in wheat (demand for which is very inelastic) will be entirely governed by the acreage and the output per acre, whereas demand for cotton will depend on factors partly germane to the industrial situation.

We may therefore conclude that the whole conception of an agricultural trade cycle is somewhat doubtful. However, there are very good reasons, as we have seen, to expect production and prices to deviate from the general trade cycle each in its own way. It would be useless, therefore, to correlate stocks of such commodities to the general trade cycle. We correlated the movements of cotton stocks with the price of cotton in the period 1885-1913, and we found an inverse correlation, after eliminating trend, of -82. Some economists will find this result very satisfactory, but we beg to differ. We prefer the simple method of graphical illustration to the dubious niceties of correlation analysis.

For the period 1928-1936 a recent inquiry has shown how the prices of different commodities like wheat, cotton, coffee, tea, rubber, silk and tin move inversely with their respective stocks.¹ Besides, a diagram is presented in which the total stocks of the commodities mentioned move inversely with their average price level. To this we added the American index of industrial production (chart III). It is, of course, well known that after the war the Trade Cycle was more intimately connected with investment in the production of raw materials, particularly in overseas countries.

¹ "Eenige Gegevens betreffende Grondstoffenmarkt" in *De Nederlandsche Conjunctuur*, February, 1937, pp. 14-20.

Chart III

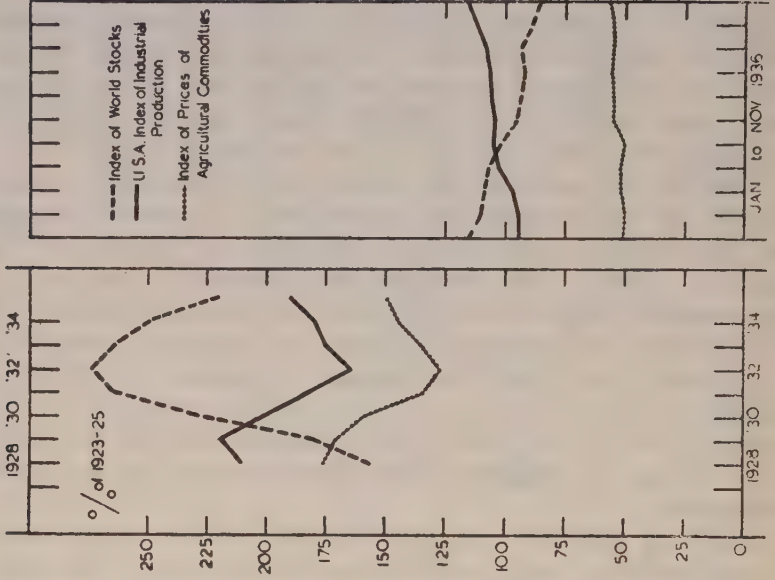
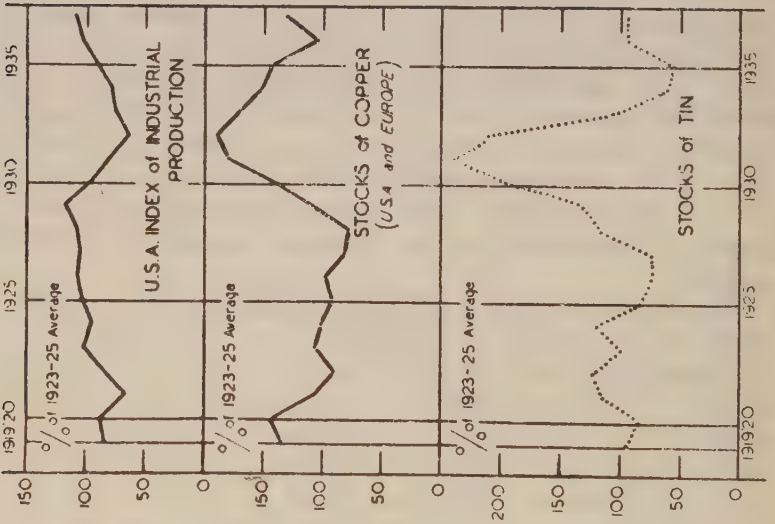


Chart II



Sugar shows a peak in 1925 (Table II, Col. 6). The explanation is given in a Special Memorandum of the London and Cambridge Economic Service.¹ The cause must be sought in the decision to increase the acreage of plantations in Cuba in 1923. We cannot deal here with all the very interesting questions with which that Memorandum deals. But in our opinion the inverted movement of sugar prices with the stocks in those years is perfectly clear.

The steady rise of stocks of cotton (Table II, Col. 8) from 1924-1927 is accompanied by a steady decline in price.² The fall in stocks in 1928 was due to a rise in price. The same holds true for the years 1921-1923, whereas the fall in price from 1920-1921 is again accompanied by a rise in stocks.

Stocks of wheat, as Mr. Keynes has told us,³ show maxima in 1896, 1899, 1907, 1923 and, we can add, 1933. But when we look at the prices we shall find them in these years at their minimum level, with the difference that with regard to the years 1907 and 1933 the price reaches its minimum one year earlier. When we examine those years which according to the *Stanford University Wheat Studies* (the statistics to which Mr. Keynes refers) are minimum years for stocks, they appear to be maximum years for prices; we have to add that since then Stanford University has compiled world stocks for the period 1922-1934.⁴ Moreover, Professor Tinbergen gives also Stocks for wheat for the period 1890-1911 which do not differ much from the Stanford Statistics.⁵

Finally it should be noticed that the stocks of wheat increase during the year 1937 (Table II, last line); the stocks of rubber and sugar do the same, and when we compare the year end stocks of cotton, we also see a rise⁶: from 6 million bales at the end of 1936 to 8.4 million bales at the end of 1937.

The stocks of pig iron, copper and tin before the war show the inverse correlation with the Cycle rather well as is seen from our chart I.

Pig iron stocks after 1896 exclude makers' stocks⁷ (Table I,

¹ J. W. F. Rowe. *Special Memorandum No. 31, Sugar*, London and Cambridge Economic Service.

² *Cotton Year Book of the New York Cotton Exchange, 1937.*

³ *Treatise on Money*, Vol. II, p. 124n.

⁴ *Wheat Studies*, Vol. IV, p. 180, and Vol. X, p. 134.

⁵ Jan Tinbergen in *De Nederlandsche Conjunctuur*, March, 1933, pp. 11-20.

⁶ London and Cambridge Economic Service, *May Bulletin*, 1938, p. 207.

⁷ *The Economist*, Monthly Trade Supplement, December, 1896.

Col. 4). The sudden fall in 1878-9 (Col. 2)—otherwise a time of intense depression—was due to a coal strike in Durham, but it was slight owing to the attempts of ironmasters to raise prices.¹ The enormous increase in 1905 was due to heavy speculation in “Middlesboro’ N. 3”.² As will become clearer later on, it was a typical instance of the case where opinions differ widely and dealers were more “bullish” than either ironmasters or iron consumers.

Copper had a special overproduction crisis (Table I, Col. 5) in 1889.³ Afterwards stocks have a falling trend for about 17 years owing to the steady expansion of the electrical industries.

After the war (Table II) the stocks of copper, tin and zinc show great irregularities, but by 1929 we find them all having resumed the inverse movement to the Cycle. Copper and zinc stocks increased in 1937, tin (where production was most rigidly controlled) already in 1936.

It remains for us to discuss the influence of monopolistic restrictions on the size of stocks, taking the case of copper, stocks of which after the war show a very close inverse correlation with business activity, with a lead of one year. The period 1923-29 appears to be very suitable for this purpose. After 1929 the phenomenon is disturbed by the Great Depression.

A combine of copper producers was formed in 1926. Until March, 1929, although stocks remained very small throughout this period, this does not seem to have had much influence on the size of stocks. But then a speculative boom broke out. The combine, more interested in high prices than in the stabilisation of production, at first allowed stocks to reach a minimum level. After a month the boom collapsed, but the high prices had by then induced producers to increase output, and because of the American anti-trust laws the combine was unable to prevent this. They tried in vain to keep the price high by accumulating stocks. After 1930, however, the accumulation of stocks was no longer deliberate.

Between 1923 and 1929 there was a cartel which tried to restrict the output of spelter. Its efforts, however, were not very successful. Production rose from 960,000 tons in 1923 to 1,440,000 tons in 1929. Moreover, as far as we know, it took no measures to influence the size of stocks.

¹ *The Economist*, 1879, pp. 421 and 559.

² *Ibid.*, 1905, p. 1072.

³ *Ibid.*, September 12th, 1908, p. 481.

IV

We shall now have to examine the distribution of raw material stocks between different classes of holders. For this purpose we shall divide them into :

Producers (of raw materials) ;

Dealers (in raw materials) ;

Manufacturers (of finished commodities in so far as they are buyers of raw materials).

We would expect that because of the costs involved in the storing of commodities, everybody wants to keep his stocks as low as possible. Moreover, we know that entrepreneurs as a rule keep their stocks in a certain relation to their turn-over. We therefore have to find an explanation why the stocks of raw materials do not obey to that rule. The obvious reason is that in the case of sudden and unforeseen changes in demand, agricultural and mineral production can only be readjusted with a certain time-lag.

Sometimes another reason is mentioned : Speculation ; about this point we shall have to say more in a later section of this paper.

If our explanation of the inverted movement of the stocks of raw materials is correct, we shall expect producers to bear the burden of these surplus stocks, for the dealers and manufacturers, who wish to maintain their proportion between output and stocks, are not responsible for the production of raw materials.

In some cases, however, not the producers but the dealers and manufacturers hold these surplus stocks. Here the explanation has to be sought in the relative ease with which in different industries different classes of entrepreneurs can obtain credit. In some fields of production the producers have a relatively large reserve of capital available, or they may have an easy access to the credit market. In other fields of production producers do not enjoy these facilities and have always to sell to dealers. It is also conceivable that the dealers may be unable to provide enough capital and that they may have to sell a part of those stocks to the manufacturers. We thus can imagine the enormous extra fall in price when at a certain moment during the slump the capital reserves of a certain field of production are becoming insufficient to finance the growing surplus stocks.

Thus the stocks of sugar in Java were negligible before 1929. "For the crop was always sold forward in its entirety before the grinding season began", as we read in *Special Memorandum* No. 45 of the London and Cambridge Economic Service.¹ After 1929 the stocks in Java (and in Cuba) and in the hands of dealers move very strongly in an inverse relation to the trade cycle.

In the same *Memorandum* is an interesting table concerning the division of rubber stocks during that period.² We combined the stocks of U.K. public warehouses with the stocks of U.S. dealers and manufacturers. Then we subtracted these combined figures from the total amount.

STOCKS OF RUBBER AT THE END OF THE YEAR : (000 Tons).

Year	U.S. and U.K.	Total	Difference	On Estates in Malaya
1928	88	301	213	35
1929	192	382	190	28
1930	320	505	185	26
1931	449	644	195	20
1932	472	641	169	22
1933	457	668	211	21
1934	496	724	228	12
1935	476	634	158	23
1936	301	473	172	26

The conclusion is that in the depression the manufacturers and dealers in these commodities bear the brunt of the burden. It is interesting to observe how the stocks in the hands of producers (on estates in Malaya) move in opposite direction to the total of stocks. It should further be noticed how during the period total stocks of rubber moved inversely towards the Trade Cycle.

The division of the stocks of copper, on the other hand, presents entirely different features. Although there are no statistics of copper in the hands of manufacturers we know the stocks in the hands of producers (American smelters and refiners) and (European) dealers.

The stocks of copper are mostly in the hands of producers, but there is a tendency for dealers' stocks to move in the same direction. The reason obviously is that producers have to carry the bulk of these stocks in order to maintain prices. They are able to do it because of the credit facilities

¹ *Stocks of Staple Commodities*, by J. W. F. Rowe and others; November, 1937, p. 24.

² *Ibid.*, p. 30, Table I.

they enjoy; they are supported by the Morgan group.¹ The dealers, as a rule, have some financial reserves and their stocks exercise a buffer function as regards changes in demand. At any rate, we are entitled to conclude that the stocks will be held in the strongest hands.

V

The main conclusion emerging from the statistics we have presented appears to be that our stocks are inversely correlated with the cycle. As a rule, they reach their lowest level very shortly before the outbreak of the crisis, while their peak level is to be found towards the end of the depression. If this reading of the facts is correct, it is difficult to accept Mr. Keynes' theory according to which surplus stocks must be exhausted before recovery can start. On the contrary, the conclusion that seems to suggest itself is that raw material stocks must have reached a certain size if they are to support a lasting recovery. This shows the highly artificial character of the division of stocks into "working capital" and "liquid capital" according to "the normal requirements" of production and illustrates the ambiguity of the concept of "surplus stocks"; for stocks that may have been surplus with regard to the level of activity at the trough of the depression may be insufficient to sustain a major recovery. It is here that the buffer function of stocks²—at least of those goods the supply of which can only be adjusted with a time-lag—comes out most clearly: without ample reserves of raw materials, recovery may soon be checked by all sorts of "bottlenecks".

On the other hand, our statistics seem to show that it is at least not impossible that prosperity should come to an end owing to the scarcity of certain factors of production. It is no doubt difficult to generalise from the material presented, because different commodities show different "leads" against the Trade Cycle, and it is, of course, by no means necessary that all the crises brought about by scarcity should be brought about by scarcity of the same factor. The coefficients of production being fixed in the short run, scarcity of *one* factor may suffice to stop *all*

¹ London and Cambridge Economic Service, *Special Memorandum* No. 32, *Stocks of Staple Commodities*, by J. M. Keynes, J. W. F. Rowe and G. L. Schwartz, pp. 10-11.

² Cf. L. M. Lachmann, "Commodity Stocks and Equilibrium," *Review of Econ. Studies*, Vol. III, n. 3, June, 1936.

investment activity. Moreover, as the Austrian Theory has shown, scarcity at one stage of production is quite consistent with unsaleable stocks at another stage. For these and similar reasons, until we have more accurate knowledge about the distribution of stocks between capital goods—and consumption goods industries in general, and of raw material stocks between producers, dealers, and manufacturers of finished commodities in particular, extreme caution in the cyclical interpretation of the low level of stocks seems advisable.

If the statistics presented are representative of the behaviour of stocks of unfinished goods in general, what conclusions have we to draw with regard to the theory of the Trade Cycle? If these stocks diminish during the upswing they evidently offer no scope for investment. It follows that for the source of that investment activity which characterises the upswing we have to look elsewhere, i.e., we probably have to seek it in investment in fixed capital. The obverse applies to the downswing, and we are therefore entitled to conclude that investment and disinvestment in staple commodities' stocks, so far from being secondary forces in the mechanism of the cumulative process, actually are retarding forces, offsetting to a certain extent the effects of investment in equipment.

This statement has to be qualified in several respects. In the first place, we have to remember that our statistics refer to unfinished goods only and that, as we said, there is reason to believe that stocks of finished commodities move in positive correlation with the cycle¹, i.e., that producers and merchants of consumption goods tend to keep their stocks in a certain proportion to their turnover. In so far as changes in raw material stocks merely offset opposite movements in the stocks and production of finished goods—owing to the lag with which raw material production is adjusted to changes in demand—raw material stocks serve as a kind of excess reserve for the industries producing finished commodities (buffer function).

Secondly, the size of stocks has a direct causal influence on the production of raw materials. Not only will output be restricted as long as stocks are accumulating—very much against the wishes of the producers who have to carry

¹ Ralph H. Blodgett, *Cyclical Fluctuations in Commodity Stocks* (University of Pennsylvania Press), Philadelphia, 1935, Appendix C, p. 171.

them—but even while they are falling it is unlikely to recover before, indeed, stocks have again reached a normal size. Thus, as long as stocks are large, an increase in demand will not immediately lead to an increase in supply ; in this case the buffer function of stocks will check the cumulative process.

Another point to be considered in this connection is the relationship between the size of stocks and investment in the production of raw materials. To the extent to which the investment activity characteristic of periods of prosperity is due to investment in raw material production our inverse correlation may not hold. Unless demand grows more rapidly than supply is forthcoming stocks will increase and prices tend to fall. This need not cause a general collapse as long as investment in other parts of the economic system remains satisfactory ; it may even stimulate expansion in raw material consuming industries. Still, it is true that investment in the production of raw materials undertaken in the expectation of a rise in demand which does not immediately occur will lead to a, perhaps temporary, increase in stocks. There is every reason to believe that the steady rise in raw material stocks between 1923 and 1929—in positive correlation with the Trade Cycle!—has to be ascribed to similar causes.

If it is true that in the past recovery has usually been preceded by an accumulation of stocks of industrial raw materials, it follows that all schemes aiming at a restriction of output by means of monopolistic control have to be regarded as potentially dangerous. One has, of course, to beware of the *post hoc ergo propter hoc* fallacy, and it follows by no means that accumulation of stocks of a definite size is a necessary condition of Recovery. It may well be that in the past Recovery would have occurred even with much smaller stocks. But we beg to submit that then it may have been much shorter. At any rate, the danger of “bottlenecks” being encountered would be greater.

For these reasons we are unable to follow Mr. Keynes in his advocacy of restriction schemes. It seems to us that such schemes are justifiable only where it is impossible for a price fall to lead to readjustment, i.e., where the following three conditions are fulfilled :

- (1) demand is very inelastic ;
- (2) prime costs are either constant or falling ;

- (3) all producers work under identical conditions so that there are no high cost and low cost producers.

Mr. Keynes argues that the present economic system offers no mechanism for the carrying of surplus stocks, hence the necessity of restriction schemes. The material we have presented seems to indicate that in spite of his contention that the holding of large stocks is too costly to be feasible such holding did and does in fact take place, and that stocks do exercise a buffer function.¹

VI

Out of the foregoing there arises the interesting problem of the scope and significance of commodity speculation during the Trade Cycle. From all we know from the reports and descriptions of contemporary observers of past booms, commodity speculation has always been a strong, and in some instances a decisive factor. But, if stocks of unfinished commodities actually diminish during the upswing, how is commodity speculation possible? The possibility of speculation in finished goods may be dismissed as it is obvious that because of their low "plasticity" large speculative transactions in them are not feasible. Moreover, we know from experience that speculation is usually most intense on the big markets for staple commodities which offer speculators the greatest facilities. How, then, is the riddle to be solved?

A given change in price is not necessarily correlated with a given volume of transactions. From the financial press we all know instances where "the movement of prices was out of all proportion to the volume of dealing". The volume of transactions necessary to bring about a certain price movement is an indication of the division of opinions

¹ After this paper had been completed, Mr. Keynes once more took up the subject of commodity stocks in a paper read at the Cambridge meeting of the British Association in August, 1938 ("The Policy of Government Storage of Foodstuffs and Raw Materials," *Economic Journal*, September, 1938). While his diagnosis has remained essentially the same,—“The competitive system abhors the existence of stocks, with as strong a reflex as nature abhors a vacuum, because stocks yield a negative return in terms of themselves,” op. cit., p. 449—his therapy is new. He seems to have grown sceptical of output restriction which “is apt to be objectionable in general, even when it is highly desirable for the particular purpose of meeting fluctuations, because it may be part and parcel of conditions of almost uncontrolled monopoly”. What he proposes is, briefly, a government subsidy for the carrying of stocks. To this we have no objection. But it still seems to us, in the light of the statistics we have presented, that his fears about insufficient stock-carrying in a competitive world are a little exaggerated. The whole issue has, however, now become a question of degree.

² H. Makower and J. Marschak. "Assets, Prices and Monetary Theory," *ECONOMICA*, August, 1938, pp. 280-1.

in the market. If everybody expects prices to rise, they will rise without any transactions taking place. Hence, the more "bullish" the market during the boom the less transactions are necessary in order to bring about a given price rise. In other words, commodity speculation during the boom will not lead to an accumulation of stocks, if sellers, buyers and consumers are all equally "bullish". It follows that stocks can increase only to the extent to which producers and speculators are more "bullish" than consumers.¹

Let us restate the same thing in the terminology of the forward market most appropriate where we have to deal with intertemporal price- and quantity-relations. Stocks can accumulate only if the forward price exceeds the spot price by more than the carrying costs, for only then it will be profitable to carry them. Hence, changes in stocks are determined by changes in the forward price relatively to the spot price. It follows that an increase in stocks during the boom can occur only in so far as the spot market tends to lag behind the forward market, i.e., to the extent to which operators in the spot market are less "bullish" than those in the forward market. Where there is no division of opinions between the two markets, and the spot price immediately follows every movement of the forward price, there can be no change in the size of stocks. Such changes are proportionate to the dispersion of opinions.

We have now seen why commodity speculation during the boom need not lead to an increase in stocks, if optimism is sufficiently widespread. But the inverse correlation between commodity stocks and the price level conceals even more interesting problems. We have found that in the upswing stocks of raw materials actually decrease, i.e., forward prices tend to fall relatively to spot prices. As we pointed out, this may be due to actual shortage of supply. Where production can only be adjusted with a time-lag, a situation may be reached in which present supply is short but future supply plentiful, and where therefore nobody will carry stocks. But the explanation of our inverse correlation in terms of increasing physical scarcity during the upswing is not the only possible one. It may be due to the superior skill of operators in the forward market who in this phase of the cycle already anticipate the next.

¹ Cf. above p. 442 about the 1905 boom in "Middlesboro' N. 3".

If a decrease in stocks indicates a tendency of the forward price to fall relatively to the spot price, this shows an increasing divergence of opinions. If this occurs during a boom, it means that forward market operators are less "bullish" than their colleagues in the spot market. In which case we shall reach the astonishing conclusion that the commodity speculation characteristic of the boom is just speculative activity of people who ordinarily do not "speculate", i.e., operators in the spot market, which drives up the spot price relatively to the forward price.

If this were true, it would be, in fact, a tribute to the superior foresight of the professional speculators operating in the forward markets, and it would, moreover, show why a free exchange economy with a well-developed system of intertemporal markets operated by specialists can weather many storms. We must not forget, however, that the relationship between the size of stocks and the difference between forward and spot price applies to covered stocks only.

This makes it extremely difficult to use our theorem for the depression. The large stocks characteristic of the downswing are, as we saw, mostly carried by producers very much against their own wishes and for the purpose of preventing a complete collapse of prices. They are probably "unhedged", since if they were sold forward they would affect prices. Therefore the accumulation of stocks in the depression cannot very well be ascribed to the superior foresight of speculators.

This is, of course, not to say that the existence of large uncovered stocks outside the market will not affect the latter. We know from experience that the existence of huge stocks kept outside the market will by forcing down the forward price cause the liquidation of "hedged" stocks.

In applying this theory to the tin market during the last 13 years we find that it is, on the whole, borne out by the facts.¹ Broadly speaking, boom periods are accompanied by a backwardation and falling stocks, depressions by a contango and stock accumulation.² In 1926, 1927 and 1928 visible supplies of tin were extremely scarce and did not reach 20,000 tons until October, 1928. Throughout this period there was a backwardation which in 1926 and 1927 averaged £6.16 and occasionally reached £10.

¹ The following figures are taken from *Tin* (annually published in London by the International Tin Producers' Association). Total visible supplies as estimated by W. H. Gartsen.

² In some markets *contango* and *backwardation* are called *premium* and *discount*.

From February, 1929, till the end of 1932 total visible supplies rose from 26,000 tons to 46,000 tons while the contango was never less than £1.

By February, 1934, stocks had fallen to 21,000 tons while spot and forward prices hardly deviated. This fall in stocks was due to the liquidation of the International Tin Pool.

In 1934, with an average backwardation of 19s. 2d., stocks fell to 12,600 tons. This must have been a minimum level, for whilst throughout 1935 and 1936 the backwardation was never less than £2, stocks remained at a little above 13,000 tons. In November–December, 1936, the backwardation disappeared and in January–February, 1937, gave way to a contango which by March had brought up stocks to about 20,000 tons.

Monopolistic interference with the tin market started in 1928: "During the year a syndicate which came to be known as 'The Group' was formed to hold tin off the market and the rise in price which began in August may mark the beginning of their operations."¹ Their activity would explain why stocks rose suddenly between August, 1928, and February, 1929, in spite of a large backwardation.

The International Tin Pool was formed in September, 1931, and by the end of January, 1932, had acquired 21,000 tons. Liquidation began in July, 1933, and lasted until the early months of 1934. There can be little doubt that but for its sales of spot tin the backwardation which did not exceed £1 before March, 1934, would have appeared earlier.

VII

At last we have to discuss what light, if any, is thrown by our investigations upon some modern trade cycle theories. Of course, how one expects commodity stocks in general and raw material stocks in particular to behave during the Trade Cycle depends on the type of theory one happens to hold. We have found that the cyclical behaviour of (industrial) raw material stocks conforms to a definite pattern which, it would seem at first sight, must rule out at least some theories.

In fact, however, practically all those theories which

¹ J. K. Eastham. "Rationalisation in the Tin Industry," *Review of Econ. Studies*, October, 1936, p. 20.

stress the importance of fluctuations in investment in fixed capital as the outstanding feature of the Trade Cycle are borne out by our material. The reason is that an increase in investment activity of this kind involves an increase in the demand for mineral products such as iron, copper, tin, the supply of which can only be adjusted with a time-lag. Hence, in the meantime stocks are bound to decrease as they are likely to augment in the case of a setback in investment activity. It follows that all over-investment theories are consistent with the results of our investigation. On the other hand, Recovery cannot possibly start in the raw material producing industries, hampered as they are by large and increasing stocks which have to be cleared before their production can recover.

Unfortunately we are not in a position to judge the relative merits of various over-investment theories. In particular, our statistics neither corroborate nor disprove the so-called "monetary over-investment theories" of the Austrian School, as we do not know enough about the distribution of stocks among the different stages of production. As we mentioned above, only two of our series include manufacturers' (rubber and cotton) stocks. Mr. Blodgett, however, has pointed out that stocks of raw materials in the hands of manufacturers tend, on the whole, to move in inverse correlation to the Trade Cycle.¹ What would be required in order to verify "monetary over-investment theories" is exact knowledge about the relative movements in the stocks of the manufacturers of capital and consumption goods respectively, but it is here that we are almost completely ignorant. Where the "over-investment" of the boom is due to investment in the production of raw materials, stocks may, of course, increase with production, and then their inverse correlation with the Trade Cycle will be broken. As we pointed out above, this actually was the case between 1923 and 1929 when all stocks were increasing rapidly.

With regard to Mr. Keynes' views on these and similar subjects we have to distinguish between his general trade cycle theory² and his thesis about the cyclical fluctuations in commodity stocks.³ Whereas the former may be described

¹ Blodgett, *op. cit.*, pp. 5-8.

² *General Theory of Employment, Interest and Money*, ch. 22: "Notes on the Trade Cycle".

³ *Treatise on Money*, Vol. II, ch. 29: "Liquid Capital".

as an over-investment theory the latter does not form a necessary part of it, i.e., the investment activity of the boom is mostly due to investment of fixed capital. The depletion of "liquid stocks" which in his opinion is a prerequisite of Recovery as well as the increase in "working capital" accompanying the phase of expansion are, on the whole, secondary forces in the mechanism of the cumulative process which originates from and centres in the investment in equipment. Thus, even if our statistics show that fluctuations in stocks so far from being secondary factors are actually retarding forces, this does not affect Mr. Keynes' argument. Moreover, we must not forget that our theory refers to strictly industrial raw materials only.

What are our conclusions to be with regard to under-consumption theories? It is well known that this doctrine cannot be disproved or proved by a mere comparison of total quantities like, e.g., investment and consumption. What is required in order to decide whether or not under-consumption was the cause of a crisis is a knowledge of events in their chronological order. In other words, what we would have to know is what increased first, stocks of finished consumption goods, of finished capital goods, or raw material stocks (the problem of "leads" and "lags").¹ Raw material stocks alone are an insufficient criterion.

There is, however, a version of under-consumption theory which has a direct bearing on the demand for industrial raw materials. In the "under-consumption cum acceleration" theory of Professor J. M. Clark and Mr. Harrod investment is linked up with the rate of increase of consumption. Hence, every slowing down in this rate of increase entails a setback in investment activity which explains the increase in the stock of mineral products. This version of under-consumption theory is therefore entirely consistent with the statistics we have presented.

The only trade cycle theory which, at first sight, it seems difficult to reconcile with the results of our investigation is that of Mr. Hawtrey, who emphasises investment in stocks as the impelling force of the Trade Cycle. But, since his theory refers to stocks of manufactured commodities only and not to agricultural and mineral products² it does not affect our argument. Moreover, it is highly probable

¹ Blodgett, *op. cit.*, p. 103.

² R. G. Hawtrey, *Capital and Employment*, London, 1937, pp. 116-17.

that stocks of finished commodities in the hands of wholesalers and retailers do move positively with the cycle. Still, if our statistical conclusions are correct, the forces released by Mr. Hawtrey's movements in finished commodity stocks are largely offset by the economic forces which we have endeavoured to describe.

A Comment on Mr. Kalecki's 'Principle of Increasing Risk'

By N. S. BUCHANAN and R. D. CALKINS

IN the November, 1937, issue of this Journal, Mr. Kalecki endeavours to explain the rôle of increasing risk as a determinant of the size of the single entrepreneur's investment. He argues that the principle of increasing risk is alone sufficient to define the size of the enterprise, and that the two more commonly cited limiting factors—increasing dis-economies of scale and imperfect competition—are either unnecessary for the purpose or of negligible importance. The principle, as formulated, is simply that the marginal risk to the entrepreneur rises as the size of his investment increases. Thus, even though the marginal efficiency of capital and the rate of interest on capital be assumed constant over an indefinite range, the rising risk curve will limit the size of investment. Two reasons are given for this behaviour of risk: (a) the larger the investment the more the wealth position of the entrepreneur is endangered in the event the business is unsuccessful; and (b) the danger and costs of illiquidity: since specific capital goods are illiquid on short notice, a sudden need for liquid capital can be satisfied only by selling the assets at a loss, or borrowing at higher than market rates. Our purpose is to comment briefly on the validity and significance of the principle.

1. Let us first examine the stated reasons why the marginal return for risk should increase with the size of the investment. For the entrepreneur the risk is in part determined by the legal form of the enterprise. Mr. Kalecki restricts his analysis to the case of the single entrepreneur who presumably operates as a single proprietor with unlimited liability. The entrepreneur may apply varying proportions of his total wealth within the business. The remainder, we assume, is held in "cash" or other investments. The whole of his wealth, however, may be commanded for

the payment of the business creditors. Obviously if he elects to commit a larger rather than a smaller fraction of his wealth to the risks of business, the aggregate losses which he may potentially incur are greater, the ratio of losses to total wealth may be greater, and his residual wealth may be rendered less safe from creditors' claims. Thus, even if objectively, large enterprises are no more risky per unit of additional investment than small, subjectively they may be so regarded by the single entrepreneur with limited wealth. As a result he may require an increasing marginal rate of return as the proportion of his total capital exposed directly to the risks of business is increased, and the fraction of residual wealth indirectly exposed decreases. This is doubtless what Mr. Kalecki has in mind. There is an upward slope to the marginal risk curve of the single entrepreneur as further investment involves a sacrifice of his personal liquidity and cash reserves.¹ But this is of significance only for the single proprietorship with unlimited liability, and for the same reasons to a lesser degree to the partnership with unlimited liability of partners. In cases of multiple proprietorship having limited liability (the corporation) additional capital may be obtained from additional stockholders. No stockholder risks his residual wealth in the enterprise and each stockholder may contribute but a small fraction of his total wealth. Hence the investment may be enlarged without necessitating increasing marginal returns for risk. If there are constant returns to scale, then the corporation may become extremely large by multiplying stockholders.

Thus it would appear that the first reason for the principle of increasing risk is dependent upon the limited funds of the entrepreneur and the imperfections of the capital market for ventures entailing unlimited liability. For the increasingly more common type of organisation, the corporation, the principle is not important in limiting size.

2. The second reason for limiting the size of the entrepreneur's investment, in Mr. Kalecki's analysis, is the danger

¹ If the owner of capital must bear some risks when he invests because he can neither remove them nor contract them out at a cost, then his choice reduces to risking all in one venture or spreading his capital over several ventures, which may not be distinguished as separate enterprises at law. Here it is doubtful if the proportion of losses to total wealth or the risk of all wealth will actually be reduced materially by diversification inasmuch as all the ventures are open to "uncertainties." While cases of this sort are perhaps conceivable any possible reduction of risk so attained would probably be offset by loss of managerial efficiency as a consequence of the divided effort of the entrepreneur.

of "illiquidity". This danger arises because the entrepreneur may invest his reserves in equipment or "take too much credit" and thus should he need cash he may be forced to sell specific capital goods at a loss, or borrow at higher rates of interest. This is regarded as a risk to the entrepreneur's investment and wealth comparable to that of unsuccessful business. Hence the entrepreneur is believed to require higher marginal returns for assuming this additional risk as more of his wealth is invested.

Some degree of liquidity is inherent in the nature of the business venture. The entrepreneur must maintain the necessary cash balances to bridge the gap between outlays and receipts and to provide for contingencies.¹ Thus in computing the marginal efficiency of total investment in the enterprise due allowance would have to be made for this indispensable liquidity. It is or should be already included in the marginal efficiency of investment which Kalecki assumes to be constant. Moreover even though such "illiquidity" be considered a danger, it does not follow that the losses or costs of it² will be proportionately greater for large than for small "factories". One might perhaps argue that in large enterprises there is a greater likelihood of financial mismanagement and consequent inability to meet creditors' claims, necessitating ultimately the "forced" sale of the factory or more costly borrowing. But this is contrary to Mr. Kalecki's assumption that dis-economies of management do not attend increased size.

¹ See Keynes, *The General Theory of Employment, Interest and Money*, p. 199 ff.

² It should be noted that if "the sudden sale of so specific a good as a factory is almost always connected with losses," this must be because either (a) the imperfection of the market for factories does not permit the seller to exact from the buyer an amount equivalent to either the true discounted present worth of the factory, or the seller's estimate of that worth, or (b) the earning power of the factory was over-estimated originally; i.e., the marginal efficiency of investment curve was assumed to be at too high a level.

The alternative to selling the factory at a loss in order to achieve "liquidity" is borrowing additional sums. Here again the form of business organisation affects the problem. For the single proprietorship one determinant, as Mr. Kalecki points out, is the proportion of total borrowing by the entrepreneur to his own capital. As the ratio of total borrowing to his own capital increases the rates of interest levied by creditors on further loans will increase. But the rates imposed by creditors on further borrowings are a function not alone of the ratio of total loans to total entrepreneur's capital. They are also a function of the proportion of the entrepreneur's total capital (assumed to be a fixed amount), which consists of liquid as opposed to illiquid assets. That is, the creditors will be interested in both how much capital the entrepreneur has in the aggregate, and in what fraction of it is in sufficiently liquid form to provide a basis for paying their claims. Thus, in the case postulated, the larger the proportion of the entrepreneur's total capital which is tied up in illiquid "factories" and the smaller the proportion in liquid form, the less favourably they will view the situation and the higher rates they will charge. For the limited liability corporation the total amount of the proprietors' investment in the business (not their total wealth) and the liquidity of the corporation alone are the factors affecting the rates for additional loans.

It is not necessary to Mr. Kalecki's argument, however, that the marginal risk of "illiquidity" and of loss attending additional units of investment in an enterprise shall increase. It is the subjective evaluation of the risk by an investor with limited wealth which is involved. As the aggregate amount and proportion of the investor's limited wealth exposed to the risks of enterprise are increased he will insist on higher marginal returns for risking more. Like the risk of unsuccessful business this may be of importance in restricting the size of investment in the proprietorship or partnership. It does not apply to the corporation which faces no similar limitation on the number of stockholders or on capital available.

3. Thus the principle of increasing risk as formulated by Mr. Kalecki may be a factor tending to limit the size of enterprises of the proprietorship and general partnership type, for which there is no access to the organised competitive capital market. It is not capable of being generalised for the economic system as a whole to form a not unimportant link in a theory of business cycles.¹ While it is hypothetically sufficient to explain the simultaneous inauguration of large and small enterprises of the simpler type, it is not adequate to account for the size of the corporation. Nor can the phenomenon of enterprises of different size be explained in reality without appeal to the usual restricting factors—dis-economies of large scale production and organisation and imperfect competition. The latter appears especially important. On the one hand, imperfect competition in the sale of the product involving a falling marginal revenue curve for the firm is typical. On the other, imperfections in the markets for capital and agents of production are characteristic. Imperfections in the capital market are such that its facilities are closed to small non-corporate enterprises except for short term borrowings. The new enterprise is limited in size in its early life by the extent of its market and its credit rating. Indeed except for some imperfection in the market for agents or products which gives an advantage to one entrepreneur rather than another, there is rarely an occasion for a new enterprise to begin. If there were no such imperfections or dis-economies of scale, the size of the firm would be indeterminate.

¹ Cf. his earlier article "A Theory of the Business Cycle", *Review of Economic Studies*, February, 1937, pp. 84-85 ff.

A REPLY

By M. KALECKI

THE criticism of N. S. Buchanan and R. D. Calkins is focussed on the point, that the results arrived at in my article are not applicable in the case of joint-stock companies and it is this point which I will try to answer briefly.¹

If a company issues bonds or debentures the situation is not materially altered as compared with the case of a single proprietorship. The greater the issue the more are dividends impaired in the event of unsuccessful business. The position is also similar in the case of an issue of preference shares (the fixed interest on which is paid from profit before dividends on ordinary shares are distributed). But what about an issue of ordinary shares? *Prima facie* it would seem that no limits are set to such an issue, but in fact this is not the case. It is clear that the shareholders of an existing company or the promoters of a new one have no reason whatsoever to grant to new shareholders the full rate of profit from the investment undertaken: on the contrary they will keep back a part for themselves either by accepting bonus shares or by issuing the new shares above par and adding the agio gains to reserves. But a limit is set to these efforts to "cheapen" the capital received from new shareholders by the fact that the narrower is the margin between the prospective dividend on new shares and the rate of interest the smaller will be the market for the new shares. Thus there exists an "optimum size" of issue which is relatively small. (Even if the company tries to increase it by "exaggerating" the prospects of the enterprise the limit is set by the cost of advertisement and kindred "services".) This explains the fact that issues of ordinary shares do not play at all an important part as compared with issues of bonds and preference shares.

The fundamental factors determining the optimum size of an issue of ordinary shares are essentially the same as in the case of floating a loan: the prospective rate of profit and the rate of interest. But their influence is here exerted in a much more complicated way and may be distorted by speculative demand for shares which is often only loosely connected with the actual profitability of the enterprise.

¹ Although I also do not quite agree with their interpretation of "illiquidity" (paragraph 2 of the comment).

However it seems justifiable to assume as a first approximation that conditions of investment activity are such as would obtain if all finance was by way of loans; this the more so, because, as mentioned above, ordinary shares do not play a very important part in the finance of investment.

I want to raise yet another minor point. The authors mention in passing that the principle of increasing risk forms "a not unimportant link in a theory of business cycles" presented in my article in *Review of Economic Studies*, February, 1937. This is not quite precise. The principle of increasing risk is used there (pp. 84-85) only in order to demonstrate the proposition that the rate of investment decisions is a function of the gap between the prospective rate of profit and the rate of interest. This proposition is not new. It has been indeed often used (e.g. in the theory of Wicksellian cumulative process) but so far I know has not been satisfactorily demonstrated. I attempted to give such demonstration with the help of the principle of increasing risk. Even if this demonstration is considered inadequate it does not mean that the proposition in question is wrong and my theory of the business cycle objectable on this ground.

1938]

Mr. Hawtrey on Short and Long Term Investment¹

MR. HAWTREY explains in the Introduction that the main purpose of this book is to vindicate his own theory of the trade cycle against a "formidable array" of other and more recent theories which "however much they differ from another, all agree in assuming that credit regulation must work mainly or even exclusively through long-term investment" (p. 3). The book falls into two parts. In the first the author gives a new exposition of his own views on the causation of booms and depressions together with an excursion into the pure theory of capital which, though not directly related to the rest of his analysis, comes in very useful in several contexts. The second part consists of an extensive review of the theories of Mr. Keynes, Professor Hayek, Major Douglas, Professor Pigou and Mr. Harrod. This is in accordance with the tradition Mr. Hawtrey has made peculiarly his own, of attempting to bridge differences between economists through an extensive and sympathetic review of every important new contribution to his subject. As always, Mr. Hawtrey's criticisms of his contemporaries are a model of patience and fairness; and in his willingness to master other people's terminologies, while adhering consistently to his own, Mr. Hawtrey is surely unique.

It is impossible to do justice, within the scope of a review, to the wealth of stimulating ideas contained in this volume. All that one can attempt is a consideration of its central theme. And its central theme is undoubtedly the relative rôle of fluctuations in short-term investment and long-term investment in the causation of the trade cycle. In a world where the difference between working capital and fixed (or instrumental) capital did not exist, and the difference between short-term and long-term lending did not exist, Mr. Hawtrey's theory of the trade cycle would become almost indistinguishable from the theories of the Swedish (neo-Wicksellian) School, of Mr. Keynes or Mr. Harrod and many others. The real difference arises because Mr. Hawtrey believes that it is the fluctuation in the amount of stocks held (in particular, the stocks of manufactured products rather than raw materials and primary products) which is responsible for the ups and downs of trade; and it is the behaviour of the short-term interest rate (or rather the inadequate regulation of it) which is responsible for those fluctuations.

This difference, as Mr. Hawtrey points out, is more than a mere difference of emphasis. Both Mr. Hawtrey and his opponents are agreed that the short-term market is much more tractable to regulation than the long-term market. If Mr. Hawtrey were right, and the short-term market was the real seat of the trouble, fluctuation in the level

¹ *Capital and Employment*. By R. G. Hawtrey. Longmans, Green & Co. Ltd. 1937 xi + 348 pp. 15s.

of activity could be avoided, or reduced to insignificance, merely by "devising and putting into practice more perfect methods of [short-term] credit regulation". To believe in Mr. Hawtrey is to be an optimist about the Trade Cycle. It is therefore all the stranger that his views should have received so little consideration. As he points out, with a few exceptions, such as Mr. Keynes, the great majority of economists have not even troubled to reject his theory.

Mr. Hawtrey's position, in the present volume, is based on two sets of contentions. The first is positive, the second negative. He asserts, positively, (a) that the variations in the stocks of manufactured goods held by "traders" (i.e. entrepreneurs) or more precisely, the traders' desire to effect such variations, are sufficiently important and widespread to account for the vicious circle of deflation and inflation; (b) that the principle consideration in determining the average stock held, in relation to turnover, for the great majority of manufactured products, will be the rate of interest, or rather the facility of borrowing (which depends on monetary policy). He asserts negatively, on the other hand, that the supposed defects of the long-term investment market, which figure so prominently in the theory of Mr. Keynes and his followers, are non-existent, or, at any rate, vastly exaggerated; that even if it is not a "perfectly contrived machine" for the transmission of the flow of savings, it is a sufficiently smoothly working machine under ordinary conditions. He would not deny that there are circumstances in which the long-term investment market "absorbs cash"; and becomes an additional source of deflation. But he contends that this can only become important when the economic system is already vastly disorganised on account of the liquidation of working capital. Nor would he deny the theoretical possibility of a complete exhaustion of investment opportunities; a "glut of capital". But he contends that in all history this has not hitherto been the case and cannot be adduced as an element of explanation until it actually occurs. And finally he would not deny the existence of variations, even vast variations, in the level of "capital outlay" (i.e. investment) between booms and depressions. But he would contend, if I understand him aright, that these variations are to be regarded as a *consequence* of changes in the flow of savings which in turn find their origin in the destruction of incomes inevitably created by short-term disinvestment. "Apart from the special case of a temporary glut of capital caused by extreme depression, we can assume that the investment market will succeed in finding an outlet for all the resources it receives; and there need not be an absorption or release of cash by the market on any important scale." (p. 104.)

Now the importance of variations in the amount of traders' stock in relation to turnover is a matter of empirical fact which I think has not been so far sufficiently investigated. Such an investigation might bear out Mr. Hawtrey's contention or it might not. But when

Mr. Hawtrey goes on to assert that the size of these stocks mainly depends on the short-term interest rate, his argument is more open to doubt, even on purely theoretical grounds. He admits Wicksell's argument that the influence of changes in the short-term rate can only be "diminutive" as compared with the influence of changes in the long-term rate, but counters it by saying that the *actual* movements of the long-term rate are much smaller than those of the short-term rate (pp. 113-114). (This, however, is no answer to the argument that a given change in the long-term rate, *if it were brought about*, would give a much more powerful stimulus than a corresponding change in the short-term rate.¹) And he counters Mr. Keynes' contention that expectations of price changes are much more important than changes in interest-rates by saying that price fluctuations are mainly found in the markets of primary products: hence the transactions *in these products* cannot be expected to be sensitive to the rate of interest. Price fluctuations in manufactured products are generally negligible. This is true; and it can be explained by the absence of perfect competition and/or the high short-term elasticity of supply in manufacturing industries. But it only shows that changes in sales are not (normally) reflected in changes of prices. It does not prove that changes in expectations therefore do not occur or are not important. *Expected* changes in demand have the same significance for manufactured products as *expected* changes in price for primary products. But, Mr. Hawtrey argues, "there is usually little or no positive ground for forecasting any definite change in demand. The data on which traders base their judgment are simply the *existing* intensity of demand and *existing* stocks" (p. 117, italics in the original). But then why should the traders in *primary products* expect changes in price? Why should the judgment of one set of traders be based more on existing facts than the judgment of another set? In both cases the judgment is likely to be based not so much on momentarily existing facts but on past experience. And the same kind of experience which teaches primary product traders to expect a fall in prices when prices definitely cease to rise, teaches the traders in manufactured products to expect a falling-off of sales when current sales cease to increase. (Mr. Hawtrey might reply that the cause of price fluctuations in primary products are not so much changes in demand but changes in supply; and it is easier to make forecasts about the latter than about the former. There might be something in this; but I doubt whether it is sufficient to bear the weight of the argument.)

But even if we accept the view that stocks are sensitive to the

¹ When Mr. Hawtrey asserts that *short-term* credit regulation has no significant influence on the long-term rate of interest, his views should command general agreement. But this only implies that the long-term rate of interest cannot be adequately regulated by the traditional methods of Central Banking technique. It does not imply that such regulation could not be secured by a different technique; or that the effect of such a policy—of regulating the long-term rate—would not be more far-reaching than that of any possible regulation of the short-term rate.

short-term rate of interest, it would be difficult to account for the kind of fluctuations which we call the trade cycle in terms of fluctuations in these stocks. For if traders decided, for whatever reason, to reduce their stock in relation to turnover, one would expect the result to be a sharp but short setback in trade, followed by the restoration of the same level of activity as obtained before. This is because investment in working capital always tends towards zero when the industrial activity is on a steady level; this type of investment only absorbs savings while activity is increasing. Thus given the level of long-term investment, the equilibrium level of activity is the same irrespective of the *size* of stocks carried by traders. Hence without the fluctuation in the level of long-term "capital outlay" it is impossible to explain how activity can be reduced and then *stay depressed* over longer periods.

When we turn to Mr. Hawtrey's views on long-term investment, his position is more difficult to make out. The argument is scattered over several chapters and his various propositions cannot always be reconciled with one another. He shows that when current activity ceases to increase because the labour reserve becomes exhausted, investment activity must switch over from the "widening process" to the "deepening process" (from increasing capital equipment by increasing productive capacity in the same proportion to increasing equipment per unit of output). In my view this train of thought should give a most valuable clue to those sudden changes in the "marginal efficiency of capital" Mr. Keynes talks about, and a most welcome addition to Keynes' theory. Mr. Hawtrey, however, dismisses it by saying that whatever savings are no longer needed for widening will be applied to deepening; that, in fact, this adjustment need cause no difficulty (pp. 70, 106-107, 126-127). The long-term rate of interest will be sufficiently adjusted to call forth the required amount of deepening; "the deepening process will go on so long as the substitution of instruments for labour can realise a saving in cost". (p. 107.)

This argument should be read in conjunction with Mr. Hawtrey's criticism of Keynes' interest theory in Chapter VII. He rightly points out (in my view) that the rate of interest is only determined by "liquidity preference" in so far as the expected future rate is not dependent on the current rate. If a change in the current rate always carried with it an equivalent change in the expected rate (what Mr. Keynes calls the "safe rate") the reduction in the rate would not lead to the holding of idle balances, and the liquidity preference theory of interest would fall to the ground.¹ He then proceeds to argue

¹ It could be argued that even so people prefer to be more liquid when the rate is lower, simply because their expectations are uncertain and there is less reward to offset this uncertainty. This type of liquidity-preference theory, however, whether true or not, does not account for the facts, for it cannot explain the wide fluctuations in the relation between the short-term rate and the long-term rate; nor can it explain why the long-term rate should actually be more stable than the short-term rate.

that, in fact, the conventional or "fairly safe" rate of interest is likely to move with movements of the current rate. "Very few people are in a position to form an opinion at all about the future rate of interest; the tendency is to accept the judgment of the market in the matter." (p. 196.) "Mr. Keynes' theory that marginal efficiency is adjusted to the rate of interest and not the rate of interest to marginal efficiency is true only of the very short period. The assumption made in the classical theory that the rate of interest is adapted to the yield of capital is true subject to no more than a moderate lag." (p. 197.)

But if this is the case, how is Mr. Hawtrey to reconcile this with his view that the long-term rate of interest is, in fact, a very stable thing, that in the "half century up to 1914 there was only one occasion when the yield of Consols diverged by as much as $\frac{1}{4}$ per cent. from the seven years' moving average" (p. 114)? Especially when he believes that the "volume of capital outlay is remarkably insensitive to the [long-term] rate of interest" (p. 188).¹ If the long-term capital market really fulfilled those functions which the classical theory and Mr. Hawtrey expect it to fulfil, if it really operated so as to adjust the level of capital outlay to the flow of savings and not *vice-versa*; and if in addition capital outlay is remarkably inelastic with respect to the rate of interest, then the rate of interest has no business to behave in the way it actually does behave, but ought to fluctuate wildly with the slightest change in the demand for investment. (Or does he regard consumption in the short period as highly elastic with respect to the interest rate?) In my view, the mere stability in the short period level of the long-term rate of interest provides the strongest empirical proof of Mr. Keynes' views on the long-term rate of interest and the functioning of the capital market.

In Mr. Hawtrey's view "equilibrium is preserved in the investment market, at any rate over short periods, rather by a system of refusing to float more enterprises than the market can absorb than by varying the rate of interest" (p. 188). But fluctuations in the willingness to lend, *relative* to the rate of interest, imply fluctuations in lenders' risk; they are fluctuations in the marginal efficiency of capital. Hence this cannot explain how equilibrium in the capital market can be maintained, without a change in the rate of interest, when the marginal efficiency curve falls relatively to the supply curve of savings: unless it is maintained by a deflation of incomes, which is Mr. Keynes' explanation and not Mr. Hawtrey's. And unless there is a sudden burst of new invention at the precise moment when the opportunities for "widening" get exhausted, how can investment activity resort to "deepening" unless the incentive to do so is provided by a preceding fall in the interest rate?

¹ This statement again is hardly consistent with the argument on pp. 113-114, referred to above, that the effect on costs of a change in the long-term interest rate must be much greater than that of a change in the short-term rate—especially if, like Mr. Hawtrey, we regard the latter effect as considerable!

Mr. Hawtrey is aware, of course, that the trade cycle is characterised by large fluctuations in the level of investment activity. But he would regard these fluctuations as a consequence of changes in the flow of savings placed at the disposal of the investment market. "There *may be* a temporary glut in the investment market, suspending the action of the deepening process. But that occurs *not because* depression diminishes capital outlay, for *it is likely to diminish savings to an equal extent*, but because the resources of the investment market are supplemented by the proceeds of liquidation of redundant working capital. If the deepening process made its normal response there would be *a substantial excess of capital outlay over savings*" (pp. 126-127, italics mine). This argument could only be true if the "depression" and the consequent reduction in savings would occur irrespective of the changes in the level of capital outlay. But barring a sudden increase in the propensity to consume, in which case the collapse of general demand, and hence the depression, could not occur at all, the reduction of savings is itself a consequence of the reduction in incomes which in turn can only occur if investment is reduced. "If the deepening process made its normal response", why should there be any reduction in savings at all? It is surely *not* necessary that the long-term investment market should "absorb cash" in the sense in which Mr. Hawtrey employs this term, in order that a reduction in capital outlay should involve a reduction in incomes: and this, I believe, is the final answer to Mr. Hawtrey's argument.¹

The fact that this review has been exclusively devoted to Mr. Hawtrey's central theme, on which the present reviewer was left unconvinced, might make it appear critical in a sense in which it was not intended. For quite irrespective of one's views on short and long-term investment, *Capital and Employment* is a very valuable book of a very distinguished author. It contains a host of excellent

¹ On p. 100 Mr. Hawtrey admits that "in practice any considerable increase or decrease in the volume of saving is usually the result of an increase or decrease in the consumers' income and particularly of that part which is derived from profit." On p. 102, however, he argues:—"If the cessation of the exceptional activity [in capital outlay] is accompanied by a *corresponding decrease of savings*, there will be no serious dislocation. There will be an increase in consumption demand equal to the decrease in capital outlay and *general demand will be unchanged*. There may be some friction in the transfer of labour from one set of industries to the other, but the expansion of general demand is not consistent with any considerable depression" (italics not in the original). This argument clearly presupposes a decrease of savings which is due to an *increased propensity to consume*, and not to a reduction of incomes: for if it were due to a reduction in incomes, this would imply a reduction, and not an increase, in the demand for consumption goods. This confusion between the two different kinds of "decrease in savings" is, I believe, the origin of Mr. Hawtrey's views on the long-term investment market. This becomes clear when we consider the sentence following the above paragraph: "Alternatively, when capital outlay falls off, savings may remain unchanged, so that there will be a surplus of unused savings and an absorption of cash by the investment market" (pp. 102-103). Now clearly the two states of affairs here depicted are not alternatives at all, and neither of them is realistic. When capital outlay falls off there *will be* a decrease of savings, and hence there *will not be* (or need not be) any considerable "absorption of cash" by the investment market; but since the decrease of savings occurs because incomes are reduced, and not because the saving-propensities of the public are simultaneously changed, the process of savings-reduction will imply a decrease, and not an increase, in consumption demand.

ideas which have not even been mentioned here ; and this, combined with the unsurpassed ease with which Mr. Hawtrey entwines analytical propositions with matters of practical observation makes it essential reading for every student of the trade cycle. His criticism of Mr. Keynes, even though it leaves the substance of the *General Theory* intact, suggests the need for several important reformulations. His criticism of *Prices and Production* is brilliant and it would be interesting to have Professor Hayek's reply to it. And his chapter on Major Douglas provides the just and painstaking Auseinandersetzung which the Major has long deserved but professional economists have so far spared him.

NICHOLAS KALDOR.

Book Reviews

An Economic History of Modern Britain: Machines and National Rivalries (1887-1914) with an Epilogue (1914-1929). By J. H. CLAPHAM. Cambridge University Press, 1938. 577 pp. 25s.

The writing of economic history, especially the economic history of a period so recent as to be almost contemporary, presents peculiar difficulties and problems. It does not deal with events so much as with slow processes of evolution. Documents are to be found, but they are seldom as important or as conclusive as constitutional or political documents often are. There is always a quantitative as well as a qualitative aspect of the economic historian's problem. The political historian has his own difficulties, for example in gauging public opinion and its influence on action. The economic historian must find the stuff of his judgments in broad selective surveys of dispersed individual activities seldom focussed in any striking event or decision. The nearer he comes to the present day the fewer path-breakers have preceded him. The essential attribute of a contemporary economic historian, therefore, is judgment—ability to discern important trends of development in a bewildering confusion of shifting phenomena.

It need hardly be said that throughout the volume under review, the third and last of a great triad surveying the rise and development of British capitalist industry in the 19th century, there is evident the mature judgment—balanced, dispassionate, cautious—of a scholar who has given long years to mastering the detail and considering the implications of a vast subject. It is of some interest to note that Professor Clapham has preferred as far as possible to let his story tell itself. That is to say he does not indulge in sweeping generalisations into which the facts can be fitted. Rather he builds up by illustration and citation a picture which gives detail and material as well as general outline. Indeed the outline is almost left to form itself in the reader's mind. Occasional dry comments are scattered through the text—almost always by way of parenthesis—but the author has disciplined himself severely so as to present not his personal views illustrated by selected facts, but the facts which seem to him to be typical. This, of course, is not to say that the facts speak for themselves. Selection and arrangement are, after all, important. One feels quite clear, however, that this is a

work where, after patient study and prolonged reflection, selection and arrangement have been designed to present and illustrate what actually did happen in the correct proportions and the proper perspective. In other words Professor Clapham has done an honest job in the true spirit of scholarship and generations of students will be grateful for his faithful and patient work. Its value will grow with the years precisely because of the way in which he has built up a detailed picture from the actual raw material.

To appraise or criticise such a work in detail is possible only to someone who has himself worked through the great mass of material which Professor Clapham has ransacked. Later students working minutely over specific aspects of economic development in this period may perhaps alter the emphasis, correct the detail or amplify the argument at certain points. A general review now cannot attempt much more than an appreciation of the architecture of this great work.

Not the least merit of Professor Clapham's book is that one does not read it easily and rapidly with a feeling that here is a complete and final explanation of historical trends. Graham Wallas always advised students to read with pencil and paper at hand. His advice is peculiarly applicable to such a book as this. On almost every page there are suggestive statements and ideas which start trains of thought that are worth following up. For example, the first chapter in which Professor Clapham surveys the international setting of the industrial state is full of ideas pertinent to the great questions of the present day. Among them one may cite (pp. 9-10) the discussion of the broad advantages of wide international markets, (pp. 15-16), the gains from rising prices as increased gold production from the Transvaal strengthened and was absorbed by the gold standard mechanism, and the importance of international investment in this connection, and (p. 50) the adaptability of the international economic system to changing industrial equilibrium as the United States and Germany developed their manufacturing industries.

One of the most significant features of Professor Clapham's arrangement of his materials is the large space given to discussion from various points of view of the relative efficiency of British industries in this period which was the culmination of a century of development. Almost the whole of Chapter III bears directly on this question, and there is evident some stiffening of enterprise. Britain had pioneered with steam-power and continued to do so, for example, with the Parsons turbine; but lagged in electrical developments, perhaps because of the strength of the coal and gas industries. Established industrial methods were not quickly or easily displaced by innovations such as mass-production. The motor-car industry went ahead faster in the United States than in Britain.

While Professor Clapham is careful to point out that British enterprise did not merit all the jeremiads of its critics, some slowing up

seems clear. The balance of argument seems to be fairly struck in the statement (p. 122) "British industries did not lead the world's advance all along the line. Their critics sometimes forgot that in fact they never had so led it; though at one time they had held many more leading places."

Some part of the reason for this gradual and partial loss of flexibility and enterprise seems to be indicated by the fact that Professor Clapham finds it necessary to devote his longest chapter (about one-fifth of the book) to what is essentially a discussion of financial consolidation and integration. Here is the material concerning limited liability, amalgamation, combinations and cartels. Leadership was passing from the smaller manufacturing units to great financial aggregations.

The remaining chapters of the book, dealing with Commercial Organisation, Communications, the Economic Activities of the State and Life and Labour, leave much the same general impression of consolidation and financial reorganisation modified by distributive intervention. Such a bare statement is of course entirely inadequate to describe the careful detail in which a complex series of developments is analysed. Throughout there is a mine of material to be worked through; but the book as a whole leaves on one's mind the impression of a curve of industrial progress which had been rapid but was flattening out, while at the peak distributive interests were staking out their claims, financiers by amalgamation and flotation, workers by trade union pressure and social services. The Britain of 1914 was not the bustling, laissez-faire, enterprising and somewhat ruthless new Britain of a century earlier.

One element in the process of consolidation seems curiously lacking in Professor Clapham's treatment. Neither in the epilogue nor in the main body of the book is there discussion of the retreat from international to nationalist economic policy. The index yields only one reference (p. 418), and that merely incidental, to the pre-war Tariff Reform campaign. Britain is now much more committed to economic nationalism, and the roots of this commitment are surely to be found in the pre-war hardening of her industry and commerce. But this is perhaps a generalisation of the type which Professor Clapham has so rigorously eschewed. The story is implicit in his careful study. For example, there is the hint (p. 306) that combinations came usually in periods of depression, a term which as the author duly remarks "must as a rule be translated by competition."

No greater praise surely could be given to a historical work than that its careful and clear exposition of past tendencies at once provokes and illuminates thought on vital issues of the present and the future. No student of our times can afford to overlook this study of the recent past.

J. B. CONDLIFFE.

Socialism versus Capitalism. By A. C. PIGOU. Macmillan & Co., Ltd.
1937. vii + 139 pp. 4s. 6d.

It is refreshing to find a book by Professor Pigou which contains no mathematics and gives full scope to his gift of lucid exposition. The book, the Preface tells us, makes no pretence to constitute a learned work, and is addressed not to experts but to the general reader.

It states a carefully balanced case, leading up to a very guarded advocacy of a gradual extension of the principle of nationalisation.

Professor Pigou's habits of thought along the classical groove make themselves felt. Having stated very fairly that socialism would abolish profit (defined as the difference between the outlay and the receipts of a middleman or entrepreneur), he yet manages to minimise the significance of the change so formulated. He even argues that, with perfect competition in capitalist industry, the size of individual businesses would be so regulated that the entrepreneurs would secure the same earnings as men of equal ability acting as managers in other industries (p. 77). "Units that are too large or too small find themselves undersold by firms of the right size" (p. 89). There must have been algebra in Professor Pigou's mind, even though not at the end of his pen.

And when he contends that the abolition of profit does not mean the elimination of the "profit motive" in the sense of the pursuit of gain, he is hardly giving sufficient weight to the special significance of the profit motive among employers of labour.

Towards the end of the book Professor Pigou comes to "the problem of central planning". Taking for granted that the test of success in an economic system must be sought in a quantitative measurement of wealth founded on the adequacy of the consumer's judgment of his own needs, he demonstrates the extreme complexity of the problem if it is not to be solved through the free competition of markets. The difficulties on which he lays so much stress seem to be mainly those of initiating a complete economic system in a community not previously engaged in meeting its needs at all; if the capitalist system were taken over as a going concern, and transformed into a socialist system, the difficulties would be much less formidable.

But, what is more fundamental, Professor Pigou seems to exclude altogether the possibility that a centrally planned system, by applying expert judgment to the real needs of consumers, may offer a wiser and more beneficial selection of goods and services for sale.

R. G. HAWTREY.

Consumers' Cooperation in Great Britain. By A. M. CARR-SAUNDERS,
P. SARGANT FLORENCE, R. PEERS. Allen and Unwin. 1938.
556 pp. 15s.

The purpose of this volume is to give a comprehensive account of the aims, methods, and results of the British Cooperative Movement.

Its three authors were assisted by a number of investigators, and by experts who acted in a consultative capacity ; in addition, every facility was given them by various cooperative bodies to examine books and accounts, and to question officials. A full dress enquiry of this scale and importance naturally leads to a comparison with the Webbs' book of 1921. For in many of their criticisms and suggestions the authors repeat and confirm the earlier writers, while in other cases the Webbs' conclusions are reinforced by the presentation of more detailed evidence, and by a greater use of statistical methods. The feature which most distinguishes this volume from its predecessor is the much greater attention paid to the more purely economic aspects of the movement. Whereas the Webbs gave a few pages to the economic theory of cooperation, a substantial part of the present book is given up to discussion of costs and margins in cooperative and private trade, of the efficiency of the societies, the relations between cooperative prices, dividends and market prices, investment policy, etc.

The many problems which are considered turn upon two main questions ; first, what is the relative efficiency of cooperative undertakings as compared with non-cooperative trade, and are the opportunities of economy fully utilised ; and secondly, to what extent is the movement realising its ideals of economic democracy ? As to the former, the authors point out that the cooperative movement, like other forms of retailing, rejects planned consumption, and is based on the shop and free consumers' choice. It aims at reducing the margin for capital and management, and at reducing costs and prices, partly by eliminating competition throughout the movement, and partly by attracting loyal custom through the dividend. After a comparison of cooperative costs with the rather incomplete and unsatisfactory information available respecting British and American private trade, the conclusion is reached that cooperative stores effect economies as against all capitalist organisation in costs of administration and advertising ; on the costs of debts and delivery as against independent shopkeepers and departmental stores, but not chain stores ; and on rent as compared with departmental stores. (Page 375.) In view of the fragmentary nature of the statistical material, the conclusions seem reasonable rather than definitely established. The most important economy is in interest, for the societies raise capital so easily that they have more than they know what to do with. Three-fifths of the aggregate capital of the retail and wholesale societies is not used in trading, but is invested outside the movement in government and municipal securities, etc. The income of the retail societies from investment is such that they have to earn only 2.4% on trading capital to pay their dividends. This tame and conventional use of resources is naturally criticised, and suggestions are made for their employment in developing new lines and in countering monopolies. The discussion of these points is one of the best parts of the book.

On the other hand, the movement lacks central direction, makes insufficient use of market research and of experts, and is backward in the arts of management, particularly in the wholesale and productive departments. Its sheltered markets, which are one source of its economies, and its methods of recruitment, which tend to keep out those who have had more than an elementary education, seem to shut it off from many modern developments. It is remarkable that with a large mass market at its command, it should have allowed opportunities like bazaar trading and radios to pass to private trade. A trading organisation which relies upon direct contact with consumers has thus been slower to realise the economies of mass distribution and the significance of the rise of the workers' standard of life than capitalist concerns which are compelled to spend large sums in ascertaining the consumer's needs.

Some of these difficulties are no doubt due to the element of local democratic control; the C.W.S. is after all a created, federal body, and local independence can and often does erect barriers which break up the unity of the market, and obstruct the endeavours to realise the full economies of mass production. But democratic control is the essence of the movement, and the authors set great store on its preservation. The technical difficulties of organising an elective and control system for thousands of miscellaneous consumers are obvious enough. That only two or three per cent. of the members take any active part in the government of the society, does not, in the view of the authors, mean that the principle has broken down, for they are likely to be representative of the whole body. But there are risks, for control can be captured by small, organised groups; in two or three societies the majority of the committee have been employees. One society has an active 'Members' Association.' In regional societies, which have many branches scattered over a wide area, the degree of effective interest in the outlying places may be negligible. Not all these problems are solved, though various experiments are being made, but the authors feel that the evidence of spontaneous democratic activity which the movement has shown is sufficient to warrant a belief that the risks can be guarded against. A study of the course of events in some of the interesting cases when critical and very controversial decisions were made would have greatly added to the discussion of this problem.

There are points which deserve more consideration than has been given them. The authors urge that the movement should endeavour to extend its sales of new types of consumption goods, but it is useless for either a local or national federal society to open one chemist's shop, one cycle store, or one radio department in each town. Insufficient attention is given to consumer's shopping, as distinct from buying habits. A glance at a map of the distributive points of these different trades will show that, with every allowance for any 'excess' of numbers which may be supposed to exist, neither the

number of points nor the way in which they are spread is accidental ; each trade has its characteristic web. Such consumer's habits may be stronger than loyalty. If they are to secure any substantial part of working class trade in these goods, the societies are faced with a considerable change of attitude and a major issue of policy on this matter. It is useless to argue beyond certain limits that shop location is of less importance than in private trade ; poor sales figures provide the answer. The effect of the growth of monopolies and state marketing schemes on cooperative expansion is discussed, but there is no detailed examination of what policies have in fact been pursued in these cases. Since the authors claim, correctly, that in a world of restrictive producer's policies the cooperative societies are the only organised potential force for the protection of the consumers, they missed a valuable chance of giving guidance to the movement in getting through this difficult territory.

The book is a valuable and informative study, and its sympathetic though critical tone should make it welcome to cooperators as well as economists.

P. FORD.

Abrégé des Eléments d'Economie Politique Pure. By LÉON WALRAS. Edited with a foreword by Gaston Leduc. Paris: R. Pichon et R. Durand-Auzias ; and Lausanne: F. Rouge et Cie S.A. 1938. 395 pp. + 4 plates. 70 francs.

It has long been known among economists that Léon Walras had prepared an abridgment of his *Eléments* before he died. To some the question that immediately suggested itself was : does the *Abrégé* contain any new developments or significant modifications of Walras' theory ? For others the poignant issue was : is the *Abrégé* an open-sesame designed to admit the mathematically untutored mind to the Walrasian mysteries ? Thanks to the pious efforts of Professor Leduc (seconded by Léon Walras' daughter, Mlle. Aline Walras), we have now an answer to both these questions. It is no in the first case and no in the second. .

In general the purpose of the *Abrégé* was to convert the admittedly difficult *Eléments d'Economie Pure* into an easier book for the use of undergraduates whose knowledge of mathematics was limited to algebra and to two-dimensional analytical geometry. To do this Walras employed three devices. One was simply to eliminate whole sections of mathematical argument. It is impossible to tell whether Walras deleted Leçons 21 and 25 of the original *Eléments* for the benefit of the ἀγνοωμετρητοί, or because he entertained serious doubts as to the validity of his doctrine of convergence towards a general equilibrium to be obtained by a series of trial and error adjustments embracing the totality of quantities and prices viewed as interdependent variables. Occasionally, as in the case of the theory of marginal

productivity which should have been expounded on page 312 of the *Abrégé*, the removal of the mathematics leaves us with a pathetic, incomprehensible ruin of the original theory. Another device was to replace his equations defining equilibrium in exchange, production and capitalisation by corresponding portions of the geometrical appendix of the *Eléments*. Walras' defence of this procedure at the close of his own preface fails to carry conviction. It is still true, as Irving Fisher has insisted, that "mere curves" are not capable of delineating the sort of functional relationships involving a large number of variables which Walras was the first to have portrayed in his *Eléments* by an imposing system of simultaneous equations. The two dimensional graphs of the *Abrégé* do not simplify the characteristically Walrasian theoretical structure; they destroy it. Finally, Walras resorted to the device of recommending Leçons 7, 9, 22 and 23 of the *Abrégé* for omission by inexperienced readers. The first two of these Leçons contain accessory arguments, and the latter two dealing with the maximisation of utility in relation to producers' goods could not be developed at all without partial differentiation.

The sequence of the Walrasian argument is the same in the *Abrégé* as it was in the *Eléments*: the theory of exchange is followed in order by the theories of production, capitalisation (including capital formation) and money. The only noteworthy difference is the substitution of one of Walras' earlier statements of the theory of money, which appeared in the *Etudes d'Economie Politique Appliquée*, for the last version in the fourth edition of the *Eléments*. This is an improvement as well as a simplification. Moreover, the Paretians will gain some slight satisfaction from Walras' belated concession, made briefly in passing (pp. 7 and 312 n.), that the *rarity*, i.e. marginal degree of utility, of a commodity may be the function of more than one variable.

The history of the *Abrégé* up to its publication sheds some light on the possible usefulness of the book as a pedagogical tool. According to Walras' own preface, he first employed a simplification of the second edition of his *Eléments* in the closing years of his own teaching at Lausanne from 1890 to 1892. The unpublished correspondence of Léon Walras reveals that he passed his first *Abrégé* on to his successor, Pareto, in 1893, and that ten years later he made a new and more meticulous abridgment based on his fourth edition (1900) at the request of Mon. A. Aupetit, who hoped to use it in his teaching in France (letter to George Renard, April 16th, 1908). Whether or not the *Abrégé* would have proved a suitable vehicle for carrying the message of mathematical economics to beginners, it is highly probable that French economics would have enjoyed a far happier fate, had Mon. Aupetit been admitted to an official chair to perform the contemplated experiment with Walras' simplified statement of his theories. In 1905 Walras attempted to persuade Henry Ludwell Moore to translate the *Abrégé* into English, but Professor Moore declined to do so, replying in a letter dated November 14th, 1905:

"You, I am sure, underestimate the difficulty of your method and theories." With this opinion the reviewer concurs.

The editor might well have included the above facts in his notice. They would have given more point to his appeal for funds to publish Walras' priceless scientific correspondence. Furthermore, had Professor Leduc exercised more care, he would have avoided certain minor errors. Having already corrected one typographical slip which appeared in the last line of page 248 of the *Eléments*, he might also have inserted the obviously necessary p_k by which $(q_k - o_k)$ must be multiplied in line 15 of page 232 of the *Abrégé* (line 2, page 249 of fourth edition of the *Eléments*). The omission of the word *Abrégé* from the back of the cover will prove annoying to those who wish to distinguish the *Abrégé* from the *Eléments* on their bookshelves.

The publication of the *Abrégé* will serve a useful purpose despite, or perhaps because of, all its faults, if it leads the discontented reader to look into the real Léon Walras of the unabridged *Eléments*.

WILLIAM JAFFÉ.

Japan: The Hungry Guest. By G. C. ALLEN. George Allen & Unwin Ltd. 1938. pp. 261. 10s. 6d.

It is never easy within the pages of a reasonably small book to present a fair, balanced and accurate picture of the economic life of a whole people. Historical backgrounds must be sketched, the values of social life appreciated and broad selective generalisations made of multifarious activity. Japan presents a peculiarly difficult problem. In addition to the strange language any real investigator must penetrate into ways of thinking and standards of value that are difficult to bring into open conversation and almost equally difficult to compare with familiar institutions in the West. Most foreigners with anything more than a fleeting acquaintance with Japan have baulked at the task. It does not take long to discover that Japan's western façade of courteous intellectuals and impressive but somewhat hollow economic development conceals a very complicated old-style Japanese social structure within. Professor Allen has managed to present a thoroughly convincing picture of this duality. The method he has used is of some interest. Perhaps one of the best ways to combine perspective with intimate knowledge is to live with the problem for a long time and then come back to it for another period of intensive study after some years elsewhere.

Despite its suggestive title, this book is not primarily concerned with Japan's imperialism, nor is it in any sense unfriendly. The Japanese call their silkworms "the hungry guests", a name that summarises with singular aptness the essential economic problem of a poor country launched suddenly and irrevocably upon a struggle for expansion and development. This is the problem with which Professor Allen is concerned, Japan's own problem, how to supply the voracious

needs of a growing people and their economic activities. The countryside, with its welling population, simple ideas, and incessant labour is in every sense the heart of Japan's problem. As long as the "hungry guests" could be fed their gossamer threads were the main support of Japanese industry and trade. The irreparable blow to liberal ideas in Japan was dealt by the failure of the silk market in the United States.

This is one of the clearest deductions to be made from Professor Allen's book. The trend towards democracy, civilian control of the fighting services, liberal foreign policies and effective international cooperation, was not in many Japanese eyes a wholesome development. So many characteristic virtues and beauties of old Japan were sacrificed. Unlovely towns, political corruption, vulgar expenditure, loud and tawdry profusion, shocked more people than was perhaps realised. As long as the merchants could claim that, with all its faults, the new industrialism was effective in raising living standards and economic strength, it was tolerated. When the depression came it had no such defence. The closing of one export market after another in recent years has given added justification to those who denied international cooperation and urged a return to simpler military and feudal policies.

Japan is not the only country where under economic stress there has been a reversion to more primitive and apparently effective methods of social organisation. The struggle for individual responsibility in a cooperative civilisation and the breaking down of privilege is difficult in any country at any time. It is always easy to revert to primitive conceptions just as it is difficult to maintain adult behaviour in private life and control the expression of infantilism. Japan in the industrial sense was hardly adolescent and it ought not to surprise anyone that, under stress, her people chose the simpler and cruder forms of national expression. Professor Allen gives a vivid picture of the seething mass of introduced but unassimilated ideas with which young Japanese have had to contend in recent generations and of the shallow foundations on which their Western façade was built.

Yet, in the long run, in Japan as elsewhere, the struggle towards civilisation must be resumed. Professor Allen rightly deprecates in an appendix the unrealistic view that the latest imperialist adventure in China will be brought to a sudden end by economic or financial disaster; but with equal justice he points out that such adventures offer no solution of the economic problem. The real danger is that economic disaster may follow on the heels of the war.

This is the best book recently written by a foreigner about Japan. Its criticism is friendly and fair. There is no condonation of the brutality in China; but Japan's own terribly urgent and difficult situation is set forth clearly. It is part of the general problem of finding ways and means to restore such international order as will accommodate growing nations like Japan in an expanding world.

J. B. CONDLIFFE.

The International Distribution of Raw Materials. By HERMAN KRANOLD.
Routledge and Sons Ltd. 1938. pp. 269. 15s.

The attention recently devoted by economists, and still more by journalists, to the question of raw materials is as clear an indication of the breakdown of world trade as the obsession with "hot money" is of the impairment of the international monetary system. In the crude Victorian era, economists and statesmen were simple enough to believe that a banker earned his profits largely by solving the latter problem while the commercial trader could be relied upon to bring raw materials and capital into combination with labour in any part of the world.

There is really not much new light that any economist, by re-examining and re-grouping the well-known statistical facts, can throw upon the geographical distribution of raw material resources, the rate at which they are being used and the impossibility of even the most richly endowed country achieving self-sufficiency. Mr. Kranold has gone over this ground in a lively but not very profound manner. His style smacks occasionally of the journalist. There are a good many digressions by the way, some of them amusing and interesting; but in fact the main object of the book, after dealing discursively with various aspects of the raw material problem in general and in particular, turns out to be a plan for "allowing the world to grow into its clothes". Upon examination one finds that this not very happy metaphor is intended to introduce a sketchy and altogether improbable scheme for a "Central Economic Planning Authority".

Besides numerous statistical tables in the text there is a 70-page statistical appendix. These may be handy for reference, but they are prefaced by the sentence: "Most of the figures in these tables have been taken either from the 'German Statistical Abstract' or from the 'Statistical Year Book of the League of Nations' or from 'The Mineral Industry of the British Empire and Foreign Countries'". Given the fallibility of typographers (and authors) and the accessibility to any serious student of these original sources one doubts whether such statistical appendices are really useful.

The most original and interesting chapter is Mr. Kranold's calculation of a weighted index of raw material wealth in fifteen different countries. Though he is diffident about the method used in what he calls "our long-winded and bothersome, risky, but not quite useless, statistical venture," this is really the new work he has done. One is tempted to suggest that time and energy would have been saved if he had kept the discursive review of various raw materials and the statistical tables for private use and, instead of a book, had written a fully considered article on this point, working out more fully the theoretical and practical implications of his calculations.

J. B. CONDLIFFE.

Colonial Population. By R. R. KUCZYNSKI. Oxford University Press. 1938. xiv + 101 pp. 5s.

This slim volume contains the result of an examination of the population figures for non-self-governing areas. Dr. Kuczynski gives figures for total population, and it appears that about 13 per cent. of the total world population live in such areas. He has also analysed colonial population by race and by continent of birth. He has thus brought together in a convenient form a mass of information of the kind that is fundamental for any discussion of the colonial problem. Unfortunately, as he points out in his Introduction, the available information is very untrustworthy. This is serious enough. But the position is all the more disquieting because those responsible for colonial administration either fail to realise the importance of trustworthy figures, or, if they do, display no knowledge of the procedure necessary to obtain them. Dr. Kuczynski compares the position in regard to collection of population figures in colonies to-day with the position in most European countries a century and a half ago. What was needed in Europe was not a patching up of the inefficient mechanisms then in use but an entirely new start. That start was made in England and France in 1801. Let us hope that this book will do something to hasten the day when a new departure will be made in the collection of colonial population figures.

A. M. CARR-SAUNDERS.

The Juvenile Labour Market. By JOHN and SYLVIA JEWKES. Victor Gollancz, Ltd. 1938. vii + 175 pp. 4s. 6d.

The first part of this book records the results of an enquiry covering 2,000 children with whom contact was maintained for two years. The children in question were brought under the enquiry on leaving elementary schools in five Lancashire towns which were selected as representing industrial conditions generally. The results, while in large part confirming much that is already known, add some interesting and important facts. As instances of emphasis upon known defects in the existing arrangements, it may be mentioned that stress is laid upon the inadequacy of a system of medical inspection under which most children have their last inspection twelve to eighteen months before leaving school, and that attention is drawn to the handicaps under which juvenile employment officers work, due to the indifference or opposition of employers to the official placing system. The records of these children show a very large amount of shifting from job to job, seldom connected with improvement of position and mostly due to dismissal from blind alley employment or to mere aimless drifting. The very unsatisfactory nature of juvenile employment emerges only too plainly from these figures. The average wage was about 9s. weekly for children between 14 and 15 and about 12s. for those between 15 and

16. The wages for girls in domestic service were "extraordinarily low". One interesting finding is that of the children staying on at school after fourteen a large number "were of the kind not likely to benefit most from continued education". "This provides some evidence of what is likely to happen when, under the new Education Act, the leaving age is to be raised subject to exemption. Almost inevitably the most intelligent children will obtain what jobs are available and an expensive educational system will be employed in providing further education for the weaker group of children."

The second part is devoted to national policy. The arguments against the exemption clause in the Act which will come into force next year are once again very convincingly marshalled, and special attention is directed to the difficulties which will be put in the way of vocational guidance. Another strong plea is made for protective legislation to cover all juveniles; the new Bill, however, will, if passed, render the present scandal a thing of the past. But it is disappointing to find that nothing is said in favour of compulsory part-time continued education. Nothing else can solve the problem of juvenile workers. The continuation school is not merely an educational instrument in the narrow sense; it can also be the opportunity for continued medical inspection, for continued vocational guidance, in fact, for keeping in touch with every juvenile, watching, guiding and advising him or her until launched full time as an adult worker. It is perhaps the greatest tragedy of our time in the realm of domestic affairs that Mr. Fisher's scheme fell under the Geddes axe.

A. M. CARR-SAUNDERS.

International Short Term Capital Movements. By CHARLES POOR KINDLEBERGER. New York. Columbia University Press. 1937. xi + 262 pp. 15s.

The subject of the repercussion of short-term capital movements upon the banking positions and income circulations of different sorts of countries has until recent years been surprisingly neglected, and all economic students will be grateful to Dr. Kindleberger for this authoritative and scholarly study. He has to cover a wide field, for he has to consider, not only movements of short-term capital deliberately made for the purpose of earning higher interest rates, as speculations, or from fear of depreciation or confiscation, but also all changes in international short-term debts which are the result of changes in the international balance of payments. Incidentally the term "equilibrating movements" is rather misleading when used to describe capital changes which are the result of other changes in the balance of payments, for the position thus reached is often very far from equilibrium, and is usually merely the first step in a long series of adjustments necessitated by the original change.

Dr. Kindleberger divides his book into four parts. In the

first he discusses the effects on incomes and on the rate of interest of changes both in the short-term foreign assets of the banks (usually of a financially minor country) and in the short-term debts due to foreigners by the banks (usually of a financially major country). In the second part he traces the mechanism, under various assumptions about the monetary systems concerned, by which an initial disturbance in the balance of payments is adjusted. In the third he considers the various possible original causes of short-term capital movements, and discusses the possible meanings of those difficult conceptions, the "overvaluation" and "undervaluation" of a currency. In the last he deals with particular problems of internal and international credit policy, and with recent actual or suggested developments of technique, especially in forward exchange operations and in the management of exchange equalisation funds. He concludes with a short but useful note on statistics of short-term capital movements (necessarily confined mainly to the United States). There is a very full bibliography and an adequate index.

It is a compliment to Dr. Kindleberger to say that the chief defect of his book is that it is too short. In order to cover the wide area which he sets out to explore, he is compelled to make parts of his exposition so condensed that the strain on the reader's attention is at times excessive. This tendency is even more marked in his summaries of the views of other writers, which form the bulk of some chapters, than in the exposition of his own views. For those who are already familiar with the work of the writers concerned the summaries are hardly necessary; for those who are not, they are scarcely adequate. Furthermore, the author does not always quite solve the difficult problem of reconciling great brevity with complete fairness to views with which he does not agree.

If he had allowed himself more space, Dr. Kindleberger could also have dealt with various important points over which he now passes with a bare mention. For instance, in discussing the effect of an expansion of incomes in a country as a result of a loan raised abroad, he introduces the concept of "flexibility of demand," which he defines (p. 58) as the income elasticity of demand for goods which enter into international trade. For some purposes it is, no doubt, sufficient to know that the result of receiving a foreign loan will be either to increase imports or to decrease exports or both, but the government of the lending country, for instance, will be more interested in knowing whether the effect of the loan will be to increase the exports of their country or to reduce the supply of commodities which they need to import. To treat "foreign trade goods" as a homogeneous concept certainly simplifies and shortens exposition, but at the cost of diverting attention from what in practice will usually be the essential point.

Another opportunity is missed in the discussion of the three stages of adjustment to a change in the balance of payments, in the example given presumed to be due to a long-term loan from abroad. The first

stage is the direct expenditure of part of the loan on imports ; the second is the increase in imports (or decrease in exports) caused by the rise in incomes due to the local disbursement of part of the proceeds of the loan ; and the third is the increase in the demand for foreign trade goods due to the local expansion of bank credit by a multiple of the increase in the banks' reserves of gold or foreign exchange produced by the loan. Dr. Kindleberger assumes, after the briefest discussion, that the third stage is essential for the adjustment of the balance of payments. (It may be noted that a long-term foreign loan is regarded throughout the book as an initiating cause of disequilibrium, and not, as is surely generally the case in practice, as a means of effecting an adjustment of a disequilibrium which has already developed.) It is true, of course, that *some* expansion of bank credit is necessary in the borrowing country if the proceeds of the loan are to be transferred at all. The interesting question, which is hardly discussed, is whether equilibrium can be restored if deposits are expanded only by the absolute amount of the increase in the banks' reserves of foreign exchange or gold—in other words, whether different currencies can be made to behave as if they were the same currency.

Nevertheless, regret that Dr. Kindleberger has not given us more must not be allowed to impair our gratitude for what he has provided. He has cleared a path through one of the most difficult sections of applied economics, and we must hope that in a subsequent book he will both fill the gaps he has left in this one and will make further application to the actual problems of the world of to-day of the principles which he has enunciated here.

F. W. PAISH.

Studies in Indian Economics. Edited by C. N. VAKIL. Longmans, Green & Co.

No. 8. *Railway Rates in Relation to Trade and Industry in India.* By R. D. TIWARI. 1937. 330 pp. 10s. 6d.

No. 9. *Organisation and Finance of Industries in India.* By D. R. SAMANT and M. A. MULKY. 1937. 295 pp. 9s.

No. 10. *Life and Labour in a Gujerat Taluka.* By J. B. SHUKLA. 1937. 291 pp. 9s.

Industrial Enterprise in India. By N. DAS. Oxford University Press. 1938. 170 pp. 10s.

Urban Handicrafts of the Bombay Deccan. By N. M. JOSHI. Gokhale Institute. 1936. 199 pp. Rs. 2.

General Wage Census. Part II. *Perennial Factories.* Second Report. Labour Office, Bombay. 1936. ix, 265 pp. 7 annas.

Economic opinion in India has tended to be sharply divided into two diametrically opposed schools ; that which abhors, and that

which wishes to imitate Western material developments. Most Indian economists belong to the latter school, and have, to a great extent, been preoccupied with descriptive studies and proposals for reforms designed primarily to promote industrialisation. The tendency has been to assume not only the desirability of industrialisation, but also the desirability of industrialisation on the Western model, and to assume both that State assistance is necessary and that adequate State assistance has been and still is withheld. These assumptions have been so strong that theoretical considerations and the possibility of alternative lines of development have tended to be neglected. This is true of several of the works previously issued, under Professor Vakil's editorship, in the Bombay Series of *Studies in Indian Economics*, and is also true, at least to some extent, of the first two works at present under review. The value of these works lies in their careful factual descriptions and analyses of important aspects of Indian economic life, but their weakness lies in neglect of more fundamental considerations, and in somewhat uncritical acceptance of Western methods and example. On the other hand, it is refreshing to find that Messrs. Samant and Mulky, and also Mr. Das (who is by no means uncritical or indiscriminating) are more concerned with defects in industrial organisation and finance in India, and with remedies for those defects, than with merely demanding the intensification of tariff protection. These problems have recently attracted considerable attention in India, and both these works show that their authors fully realise that "protection is not enough," but that there are grave defects in the internal organisation and financing of industries in India which militate against that progress in the direction of industrialisation that is so ardently desired. Messrs. Samant and Mulky wrote the bulk of their work between 1930 and 1933, and it is unfortunate that publication was delayed, not only because Dr. Lokanathan's *Industrial Organisation in India*, published in 1935, covered much the same ground, but also because the new Indian Companies' Act, 1937, has altered many of the conditions to which Messrs. Samant and Mulky refer. The main provisions of the new Act are explained, with illuminating critical comment, in an Appendix, but the text has not been brought up to date. On the other hand the scope of their work is in some respects wider than that of Dr. Lokanathan, especially with regard to the financial aspect. One chapter is devoted to the organisation and finance of small-scale industries, a vital Indian problem to which insufficient attention has been paid in the past, but this is slight, and might, with advantage, have been expanded. The authors are more drastic than Mr. Das in their condemnation of the Managing Agent System, which they think should be completely abolished. They recommend the establishment of an Industrial Bank, but fail to meet the criticisms that have been directed against that suggestion. And what do they mean by referring to the "well-known theory of industrial organisation" that

cost of production necessarily decreases with an increase in scale of production, and by arguing that the idea that monopoly leads to higher prices is disproved by the continued growth of industrial combinations and monopolies?

Mr. Das's readable Essay on *Industrial Enterprise in India* is a sequel to his *Banking and Industrial Finance in India*, published in 1936, and presents an intelligent analysis and commentary upon the organisation and finance of large-scale Indian industries. This work is fully up-to-date, and provides interesting material on certain recent developments, such as the phenomenal growth of private companies and the tendency to create new managing agencies in connection with the promotion of sugar-refining companies. Dr. Das considers that the time is not yet ripe for the complete abolition of the Managing Agent System, and favours the undertaking of industrial finance by the Imperial Bank, and the establishment of an Industrial Credit Corporation, to promote cottage and small-scale industries, rather than the establishment of an Industrial Bank. He recognises clearly that the men who work a system are as important as the system: "No amount of legislation can make management more efficient or honest than it is, nor can it make shareholders more active and intelligent than they are".

Mr. Tiwari has collected interesting facts and figures in his detailed analysis of railway rates and recent changes therein in India, and corresponding commercial and industrial developments. But his theoretical introduction is lamentably weak. He never enunciates clearly the theoretical basis of price discrimination, and fails to analyse the financial position of the Indian railways as a whole, with the result that his proposals for rate changes are completely divorced from any general financial scheme. His one idea seems to be to reduce charges on certain commodities in order to assist Indian producers, irrespective of the repercussions on railway revenues. His recommendations would undoubtedly necessitate substantial subsidisation of the railways, but he fails to face this issue.

Mr. Shukla has made a stimulating and intelligent survey of the economic life of an administrative area, known as a "Taluka" in Gujerat, and suggests an ingenious method for overcoming the difficulties encountered by various authorities who have emphasised the urgent necessity for a systematic rural survey in India. The problem is that extensive surveys, compiled mainly from Government records, are not realistic, whilst intensive village surveys are either insufficient for generalisation, or too costly. Mr. Shukla has contrived to combine the extensive and intensive methods in a manner that might, with improvements suggested by further experience, solve the problem. Incidentally he throws much interesting light on a number of important problems, such as the decline in irrigation in certain areas, and the relative earnings and indebtedness of the various agricultural classes.

Mr. Joshi has tackled, for the Deccan, one of India's most pressing problems. He gives an interesting account of the history and present organisation of the principal urban handicrafts but fails to present any adequate analysis of the relative costs of small and large-scale production, whilst his recommendations do little more than echo the advice of the Bombay Banking Enquiry Committee.

Finally, grateful thanks must be given for the Second Report of the General Wage Census, Bombay. The lack of reliable information with regard to wage-rates and earnings in India is notorious. This Report sets forth clearly the conditions of work, money wages, and concessions accorded to various classes of workers in the Printing Industry, and also includes much miscellaneous information with regard to the processes involved, hours of work, and provision (or, rather, lack of provision) of welfare work.

VERA ANSTEY.

British Experiments in Public Ownership and Control. By TERENCE H. O'BRIEN. 1937. 304 pp. 10s. 6d.

Mr. O'Brien writes on the origins, structure and past performance of the Central Electricity Board, the British Broadcasting Corporation, and the London Passenger Transport Board. His book will be welcome to many of those who wish to know more of these bodies, and he gathers together in a convenient form much of the available material. To the student who will have, in any case, to read the main reports where much of the material used by Mr. O'Brien is set out in more detail, the interest of Mr. O'Brien's book will be in the information which, because of its absence in published work, must have been obtained in interviews with "members, officers and servants" of the various Boards. Mr. O'Brien is not "concerned with the basic question of what spheres of economic and social enterprise ought to be transferred to public ownership and control; nor with elaboration of an *a priori* view of this particular method of achieving that transference". His primary aim is descriptive. None the less, he is able to state in his concluding chapter that he "believes that each of the services discussed in this book has proved the suitability to its own purposes of this form of public ownership and control".

The institutions are each examined under twelve heads, the origins, the functions, the economic and financial status and so on until we reach number twelve, public relations. The fact that Mr. O'Brien is dealing with three institutions, and that there are so many aspects in which he is interested, means that each of these is dealt with summarily. Some parts can stand such treatment; but others suffer greatly. This is particularly true of the sections dealing with the origins of the three institutions. The account of the Central Electricity Board furnishes an example of this. The circumstances surrounding the passing of the early Electricity Acts are dealt with very shortly while

the part played in the development of the British electricity supply industry by the Power Companies is surely worthy of more attention. One statement of Mr. O'Brien's is very misleading. He states that "the widespread participation of municipal and other local authorities in the business of supplying electricity" was "not found to any significant extent in either the American or German development". Although this is true of the United States, it is quite untrue of Germany. When dealing with the operations of the Board, Mr. O'Brien's interest in political rather than economic factors becomes apparent and he makes no attempt to guide his readers through the intricacies of the Grid tariff, although he does refer to the excellent articles on this subject by Professor M. G. de Chazeau. Mr. O'Brien is impressed with the work of the Central Electricity Board, but one cannot help feeling that he is somewhat uncritical when one reads as one of his main conclusions, "there can be small doubt that the standardisation of frequency already accomplished and before long to be completed represents a solid investment, both from the standpoint of operations and from that of the manufacture of apparatus". He has no discussion of this point and nowhere mentions that the cost of standardising frequency will probably be about £20,000,000 by the time the change is completed. His conclusion may be correct, but to justify that expense one would have expected a detailed account of the extent of the savings resulting from this measure. In his account of the British Broadcasting Corporation, a fuller account of the origins of that institution would have been interesting. Otherwise, given the space which Mr. O'Brien has to devote to the B.B.C., he covers most events adequately. In his account of the London Passenger Transport Board, he tells in the conventional way of those in the transport field, a tale already fairly well known to most economists.

A feature of Mr. O'Brien's book is that he is not much concerned with those aspects of the work of these authorities which are most interesting to the economist, nor does he consider many of the political factors which seem important to most economists. He points out the difficulty, when the State enlarges the scope of its intervention in economic affairs, of retaining democratic control. He thinks, however, that such semi-independent bodies as those about which he is writing, may solve what he terms the conflict between "democracy" and "efficiency". He assumes that bodies of the size of those he is considering were necessary for reasons of "efficiency". Mr. O'Brien tells us of the advantages of national control of generation by the Central Electricity Board and of the standardisation of frequency in his section on that body. Yet when dealing with the London Passenger Transport Board, he points out that this body generates practically all its own electricity. He quotes Mr. Pick's statement that "we can make electricity cheaper than we can get an offer from the Grid to supply it" and Mr. O'Brien goes on to add that this "and the costs which the Board would incur in converting a large part of

its plant to standard frequency, are no doubt excellent commercial justification for it". Mr. O'Brien does not discuss the comparability of this state of affairs with the arguments which he used in his section on the Central Electricity Board.

Mr. O'Brien seems to see no difficulties in the development of monopolistic vested interests. He does not discuss the possibility of those in charge of these bodies attempting to prevent the development of substitutes which would reduce the importance or impair the revenues of these organisations. And yet examples of such possibilities can be obtained from the history of the organisations he is considering. The pressure of municipalities owning gas-works, or wishing to own what were thought to be profitable electricity works, was one most important influence leading to "waste and unco-ordinated production in electricity". The treatment of public relations departments is very instructive. Mr. O'Brien says of the London Passenger Transport Board: "The modern Press, with its capabilities of suppression and exaggeration, is in a position to inflict serious psychological damage on a large and vital public undertaking such as the Transport Board. At the same time, the Board is an important source of news, as well as a large purchaser of advertising space. By the use of tact and application of the principle of reciprocity it is possible to establish a working relationship satisfactory to both interests . . ." Are we to assume that the results of this tact and reciprocity are necessarily in the public interest? Is there no conflict of producer and consumer interests? Is it not one of the dangers of making these corporations independent of Parliament that politicians are able to shelve this difficult issue?

R. H. COASE.

Social Survey of Plymouth. Second Report. By R. M. TAYLOR.
P. S. King and Son. 1928. 67 pp. 3s. 6d.

The second report of the Plymouth Survey gives a fuller analysis of the problems described in the first, which was reviewed in this Journal in May, 1937. The additional information brings out some of the peculiarities of the area. At the date of the survey the population of Plymouth was declining, there was a deficiency of males of marriageable age, and families were unusually small. Overcrowding was higher than in East London, while family incomes were lower and the proportion of incomes absorbed by rent higher, being no less than 24% as compared with 14% in East London. Some of these characteristics are of long standing. Its housing problem was apparently worse in some respects than that of any other town in England, except a small portion of London, as far back as 1851, and was singled out for comment by the Registrar General in 1911, while in the latter census year it headed the list of towns with small families. The persistent local differences of housing, even between adjacent towns, revealed

by surveys and census, have not yet been fully investigated; the unexplained variations of local building costs pointed out by P.E.P. in their Housing report are another aspect of the same problem. Sixteen per cent. of the working class population were below the poverty line. Plymouth thus joins the other provincial towns so far surveyed, Merseyside, Southampton, and Sheffield, in showing a larger incidence than East London, which had 12%.

The methods used are similar to those of other surveys, though there are some differences of definition which affect the interpretation of the results. In place of the census definition of the family based on the common table, this survey made the pooling of income the criterion; so that married daughters whose husbands were away, and who were living with their parents, were treated as separate families. The term 'working class' was limited to families with an income of less than £5 per week, which means that the presence in a family of two skilled adults receiving the average wage of the area as recorded in Table 31, namely, £2 13s. 10d., would presumably exclude it from the survey. This last definition tends to decrease, while the preceding one tends to increase, the incidence of statistical poverty. One of the most interesting parts of the Report is a severe criticism of the Ministry of Health's Overcrowding survey, on the ground that local authorities were left to determine for themselves which houses were working class, and that they interpreted the term differently.

The Report sets forth the results of the Survey logically, the reader being carried step by step through the survey procedure by commentary on forty-six tables. The numerical data are thus fully supplied, but the choice of this form of exposition has disadvantages, since sometimes there is insufficient space left in which to discuss the inter-relations of the various tables. Commenting on Table 31, the Report says that it is disquieting that 15% of the adult workers should be receiving less than 30/- per week, but Table 38 shows that a large proportion were engaged in retail distribution and domestic service, where the average was £1 8s. 9d., and 10/- respectively. The majority of these must have been females. Work of this character is both exacting and arduous, as well as full of practical difficulties, and those responsible deserve praise for carrying it through successfully.

P. FORD.

An Econometric Approach to Business Cycle Problems. By J. TINBERGEN.
Actualités scientifiques et industrielles. Hermann & Cie, Paris.
1937. 73 pp. 18 frs.

Dr. Tinbergen's book is an extremely interesting piece of pioneering work in the field of econometrics.

It has a double aim: first, to illustrate the working of a method, second to solve some particular problems. The application of the

econometric method is forced on the Economist by two considerations. The first is that the technique of small models breaks down, if we cannot point to a few factors of predominant importance which enter into sufficiently stable relations.

Unfortunately this is not often the case. The system as a whole acquires a certain measure of stability by the interaction of a fairly large number of not very stable relationships. These relationships moreover are dynamic, i.e., they involve time-lags.

The second consideration is that if any progress is to be made here, it is necessary to work with definite forms of functions and this means practically with linear—or logarithmically linear—forms. Furthermore it is very desirable to gain some idea of the relative magnitudes of the co-efficients involved, for when the number of abstract possibilities is so large—i.e., when the limitations imposed by theory are so few—it is very necessary to be able to exclude some possibilities at least on empirical grounds.

This is the case for econometrics and, as far as I can see, it is unassailable. How far we can get by means of the econometric approach it is too early to decide. The advance of this branch of Economics seems to be bound up with the advance realised in the theory of time series.

The first part of Dr. Tinbergen's book is taken up with the attempt to obtain approximate values for his constants. He finds that linear relations in the deviations from trend—approximated by a moving average—give a sufficiently good fit. Some regression co-efficients seem to be somewhat uncertain, as is indeed admitted by Dr. Tinbergen. It would be interesting to take away two years at the "tail" of his time-series and add two years at the "head" and thus test the stability of the relations. It may interest the theoretical Economist that Tinbergen was not able to trace any significant influence of short-term rates of interest on investment. The influence of share-prices on investment cannot be isolated owing to the high intercorrelation between profits and share prices. A similar conclusion was reached by O. Donner ("Die Kursbildung am Aktienmarkt," Sonderheft 36. *Vierteljahrshefte zur Konjunkturforschung*, Berlin, 1934). Further studies on the influence of long-term rates would be very welcome, especially in the case of residential building and investment by local authorities.

The second part of the book analyses the "natural tendencies"—Eigenschwingungen—of the Economic System as a whole. Given the data and the arbitrary movement of the system in an initial period, the further development of the Economic System can be predicted, unless a change in data occurs. These changes in data can be either irregular, e.g., harvest variations, changes in fashion or regular, e.g., seasonal variations. Regular changes in data can be taken care of fairly easily. They enter the system as "known functions of time". Irregular fluctuations—impulses—are more troublesome, since they

seem to make prediction of the movements of the system impossible. But if there is a sufficient number of independent shocks and if the number of large shocks is small, commonsense suggests that the average period of fluctuation of the system should be left unaffected by these shocks, and indeed this seems to be the result obtained by R. Frisch in a number of studies. (R. Frisch: "Propagation problems and impulse problems in Economic dynamics," *Economic Essays in honour of Cassel*.) This result, if it applies sufficiently generally, is of very great importance inasmuch as it enables us to predict movements of the system merely by studying its "natural tendencies".

Systems can be classified according as they "naturally tend" to exhibit periodic or aperiodic, damped or anti-damped movements. The character of the movement depends on the structure of the time-lags and elasticities involved. This gives rise to variation problems of the following type: What would be the effect on period and damping of the system, if a certain co-efficient were slightly increased all other co-efficients remaining the same? Thus, for instance, Dr. Tinbergen mentions the problem whether an increased dependence of investment on the rate of increase of profits, or the rate of increase of prices, or the rate of increase of production would lengthen or shorten the cycle, increase its violence—reduce damping—or diminish it—increase damping. It can be shown fairly generally that "speculation" in this particular sense—i.e., dependence of expectations on the present rate of increase of profits, etc.—shortens the cycle and increases its violence. Questions of this type have been analysed by Haldane (*R.E.S.*, 1934, Vol. I, 3), Kalecki (*Econometrica*, 1935), Tinbergen (*Econometrica*, 1935, and part III of the present book). The technique employed in the treatment of these questions—i.e., solving and discussing a system of linear difference equations or integral equations or integro-differential equations—Dr. Tinbergen was the first to use systematically in Economics. (Cf., Tinbergen, "Ein Schiffsbauzyklus," *Weltw. Archiv*, 1931; "Les équations fonctionnelles," *Econometrica*, 1933.)

Unfortunately, on this occasion Dr. Tinbergen's conclusions are marred by a slight error. The solutions of the characteristic equations on page 56 are real, not complex as stated by Dr. Tinbergen. This implies that the Dutch Economic System, if left to its own devices, would exhibit an exponential movement combined with a damped zig-zag movement (period two years). The Dutch cycle would therefore be wholly due to causes external to Holland or it might be due to erratic shocks and not to the "natural tendencies of the model" (cf., E. Slutsky, *Econometrica*, 1937, S. Kuznets, *Journal American Stat. Ass.*, 1929, Editors (R. Frisch), footnote, *Econometrica*, Jan., 1938, p. 31). This result—if true—is certainly very interesting and lends substantial support to the view held by Frisch, Slutsky and others that "the cycle" is due to the summation of random shocks and that these random shocks need not operate on a cyclical mechanism

at all. It is, however, doubtful whether Tinbergen's co-efficients are sufficiently well established to bear the weight of these conclusions.

In the last part of his book, Dr. Tinbergen discusses problems of policy under two headings. First, what are the consequences of given measures, e.g., public works, protection, devaluation, etc.; second, which policy is best from the point of view of eliminating cyclical fluctuations of employment.

Dr. Tinbergen shows that the crucial problem of policy in a small country like Holland consists in eliminating or compensating the "imported" cycle. This can be done either by compensatory public works or by compensatory movements of exchange rates or exchange control. The latter is not discussed, but it hardly raises new problems of theory. As to the question, public works versus managed exchanges, Dr. Tinbergen is inclined to think that management of exchange rates will provide a more powerful weapon in a country like Holland than public works. Both policies can, however, be combined as was shown by the example of Sweden during the last depression.

If there is any criticism to be made of this extremely stimulating section of the book, it is that in a discussion of the effects of devaluation or wage reductions in Holland, it is surely more realistic to drop the assumption that the volume of Dutch exports is fixed by world prices quite independently of Dutch prices. Dr. Tinbergen's assumption that the prices of Dutch export goods are given by world market conditions by no means suggests the further assumption that the volume of Dutch exports is determined solely by world market prices, as Dr. Tinbergen seems to think.

Furthermore, if devaluation does not affect the volume of exports, but only increases profits in the export trade as in Dr. Tinbergen's analysis, it does not seem very plausible to assume that the profits realised by the export trades will appreciably stimulate investment.

But these faults are of minor importance and can in no way detract from the value of a very substantial contribution to Economic science.

E. ROTHBARTH.

Monetary Nationalism and International Stability. By F. A. HAYEK. Longmans, Green. London. 1937. 94 pp. 5s.

This volume comprises a series of five lectures given at the Institut Universitaire de Haute Etudes Internationales at Geneva. They present a defence of an international monetary system against the strictures that have often been levelled against its best known form, the gold standard as we have known it, and a critical appraisal of the alternative of national monetary systems.

Professor Hayek's ideal international system would be one in which movements of money proper across national boundaries were as free and unimpeded as flows within national areas and in which a movement of money would represent equally the money lost and the money gained. Only under such a system, according to Professor Hayek,

would it be possible or likely for movements of money to lead directly and without further transient and undesired consequences to the redistribution of world income made necessary by the forces causing the money flow.

The author supports and illustrates the conclusion by examining the changes which take place under active monetary systems as consequences of, *e.g.*, technical change. Thus under customary gold standard procedure, a country suffering a loss of export trade loses gold, suffers a contraction in its credit basis and raises interest rates. A reduction in incomes is thus effected partly through a reduction of activity in the capital trades. Such a reduction may not, according to Professor Hayek, reflect any alteration in the disposition to save or the profitability of investment. The rise in interest rates and the consequent reduction in investment activity is, as it were, a consequence of protecting reserves. Again, under inconvertible paper conditions, a country suffering a loss of markets may lower the value of its money with consequent benefit to other producers, while a country benefiting will raise the value of its money with disadvantage to other producers in the form of falling domestic prices. Thus, the argument runs, in practice the consequences are likely to be a definite tendency towards inflation, for the country suffering will tend to raise other prices to counterbalance the fall in price of certain goods, while the country benefiting is likely to accept the rise in prices in industries favourably affected while preventing a fall in prices elsewhere. And inflation is impossible without distortion of economic activities. Only a truly international monetary system would, it is concluded, avoid these and other more serious and more well known difficulties. Bastard systems have the defects of their nationalistic taint.

Against this very welcome defence of internationalism there are certain criticisms of which Professor Hayek is well aware. How can it be established? How can we get 100 per cent. money? What can be used as money? But it may also be that certain of the difficulties that Professor Hayek deals with are difficulties inherent in a money economy and would not disappear even in a world monetary economy, while yet other difficulties might make their appearance. Although, no doubt, time did not allow Professor Hayek to expand his thesis, it is to be regretted that his conclusion is not arrived at by more positive argument.

JACK STAFFORD.

Recent Important Foreign Books on Economics

The Librarian of the British Library of Political and Economic Science has made arrangements, as a supplementary check to the purchases of the Library, to receive regularly every quarter from competent foreign scholars lists of the most important books in their respective fields of study published in their own countries (or languages as the case may be) during the preceding three months. It appeared to the Editorial Board of *ECONOMICA* that these lists might prove useful to other institutions, and the lists of books on economics will therefore be published regularly in future issues of *ECONOMICA*. It must be understood, however, that the Editorial Board of *ECONOMICA* accepts no responsibility for the selection of the books included in the list.

AMERICAN BOOKS

(Selected by Professor H. Gideonse).

- HANSEN, ALVIN HARVEY : *Full Recovery or Stagnation?* New York. 350 pp.
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